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DETROIT

PACE SETTERS

by Bagley & Sewall

IN PRODUCTION OR IN CONSTRUCTION DURING 1937

for KRAFT . .	. . A 210 inch Fourdrinier machine for Crossett Paper Mills, Crossett, Arkansas.
for BOARD . .	. . A 146 inch cylinder machine for Clifton Paper Board Company, Clifton, New Jersey.
for CIGARETTE .	. . A 96 inch Fourdrinier machine for Smith Paper Inc., Lee, Massachusetts.
for PHOTOGRAPHIC SPECIALTIES	. . A 110 inch Fourdrinier machine for Eastman Kodak Company, Rochester, New York.
for SULPHITE SPECIALTIES	. . A 136 inch Fourdrinier machine for Kalamazoo Vegetable Parchment Company, Parchment, Michigan.
for FELTS . .	. . A 166 inch Fourdrinier machine for Armstrong Cork Company, Fulton, New York.
for CELLULOSE .	. . A 128 inch special cylinder machine for Dominion Cellulose, Limited, Toronto, Ontario.

PLANT
PRODUCT
AND POLICY . .

★ *We feel to a decided extent that a product is an indication of the factory and organization which produced it.*

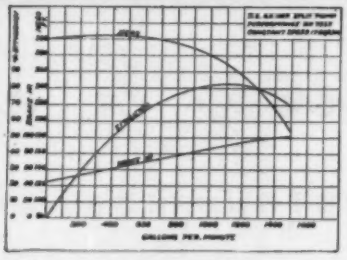
It is our engineering policy to incorporate in the design of our paper machines a proper simplicity of construction to assist operation, yet with this maximum of simplified design include a type of rigid, well-designed construction, which we feel has been characteristic of Bagley and Sewall products.

Into machines of wide or narrow widths or of different types, go the same painstaking manufacturing efforts.

THE BAGLEY & SEWALL COMPANY ★ WATERTOWN, N. Y.

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



The "almost-perfect state".....

A few years ago, a well-known columnist (not the editor of The Morris Hydraulic Column) described his conception of a modern Utopia—the "almost-perfect" state. If he had known about the efficiencies of Morris Centrifugal Pumps, he certainly would have insisted that Morris Pumps be used wherever liquids were to be handled in such a community. Morris Pumps are famous for their "almost perfect" conversion of mechanical energy into hydraulic energy. Many are operating at efficiencies of 90% or better. You should know more about these "almost-perfect" pumps. Bulletins on request.

Toughened by tanning?.....

The Kistler Leather Co. writes us: "Morris Pumps have most certainly given long and satisfactory service in our tanneries". "*Most certainly*" is none too strong an expression, for one of their Morris Pumps is 51 years old, and another is 49 years old. We know that tanning toughens leather, but doubt that the tanning liquid handled by these Morris Pumps explains their long life, for Morris Pumps have lasted similarly long on many another service. Morris Bulletins explain why—write for copy describing types in which you are interested.

For authoritative recommendations on any pumping problem, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal cities.

THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Devoted to the Interests of the Pulp and Paper Industry

MARCH, 1938
Vol. 19—No. 12

LEADING ARTICLES

Pulp for Rayon Manufacture..... *Gustavus J. Esselen and Martin H. Gurley, Jr.* 1395

Black-Light in the Paper Industry..... 1398

More Uniform Rolls on Drum Reels..... *A. M. Cooper* 1402

Importance of Clean Steam in Paper Mill..... *W. F. Schaphorst, M.E.* 1403

Paper Mill Felt Washing..... *Dr. R. W. Mitchell* 1404

Connecting Motor to Load..... 1407

A.P.P.A. Has Record Attendance at 61st Annual Meeting.. 1409

Twenty-third Annual Meeting of the Technical Association 1411

Meetings of Divisional Bodies..... 1429

Salesmen's Association Roster Reaches Highest Mark..... 1432

Survey of the Paper Industry.....1434

REGULAR DEPARTMENTS

Editorials	1369-1370	Technical Developments	1451
Current Thought	1372	Papermaking Patents	1459
Paper Sketches	1408	Commercial Outlook	1463
New Publications	1439	Domestic Raw Materials	1465
Safety Contest Scores	1441	Imports and Exports	1467
Opportunity Section	1442	Classified Index	1469
Power	1449	Index to Advertisers	1475

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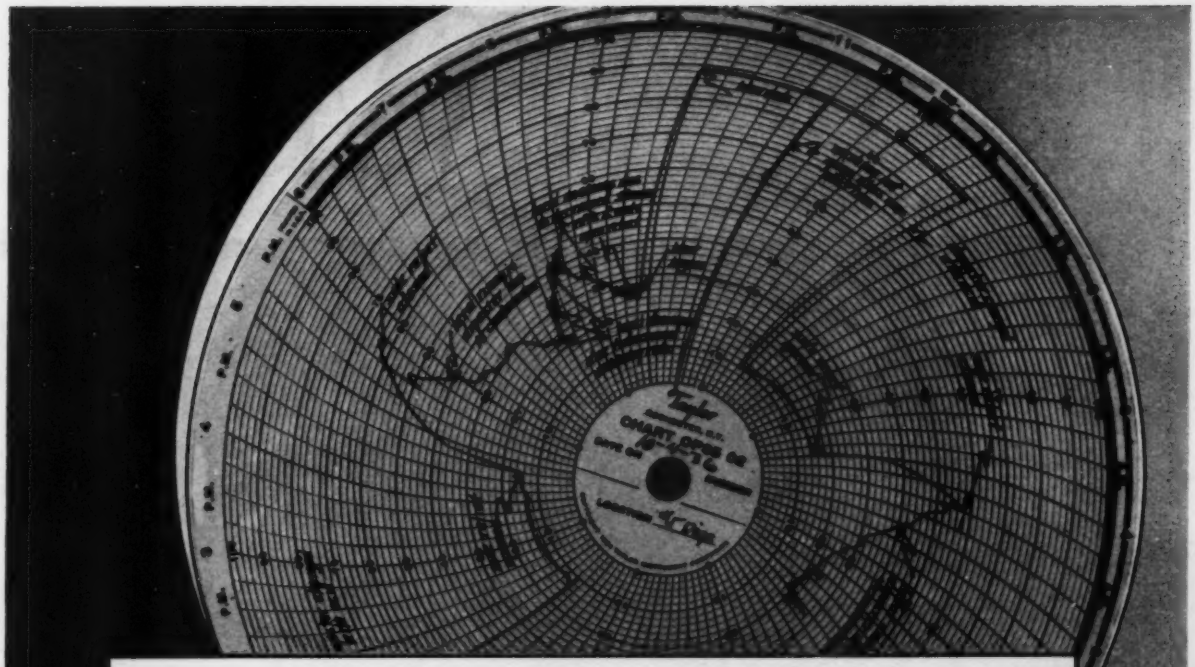


THE TRUTH, THE WHOLE TRUTH

and nothing but the truth

ABOUT LIQUID LEVEL IN THE DIGESTER

Users of the* CHEMI-PULP PROCESS *method of cooking use Taylor Liquid Level Recorders to obtain maximum efficiency in production and quality

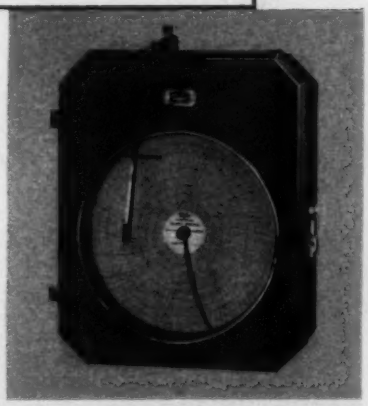
PREHEATING and liquor-circulating systems are proving themselves in many leading mills. And Taylor Instruments are contributing greatly to the efficiency and accuracy of this latest processing method for sulphite paper.

One of the important jobs done by Taylor Instruments is keeping a check on liquor, or acid, level in the digester. A Taylor Liquid Level Recorder tells the truth, the whole truth and nothing but the truth about the liquid level during and after cooking.

On permanent, easily read charts like the one above, the Taylor Liquid Level Recorder writes invaluable reports. These furnish a complete check on digester operation. They help save time and prevent waste. For instance, when the side relief of the digester is opened and the liquor drawn off, the operator knows exactly what the liquid level is. He can be absolutely certain that the chips are not being uncovered.

An accurate, durable Taylor Liquid Level Recorder on the digester and one on the accumulator are only two Taylor Instruments to help assure you of finest pulp at lowest cost. Taylor Temperature and Pressure Recorders and Controllers precisely, automatically maintain temperatures and pressures for efficient, economical operation.

All these instruments are examples of how Taylor keeps step with the latest developments in the pulp and paper industry. For the full story about them, just see a Taylor representative. Or write Taylor Instrument Companies, Rochester, N. Y. Plant also in Toronto, Canada. Manufacturers in Great Britain—Short & Mason, Ltd., London, England.



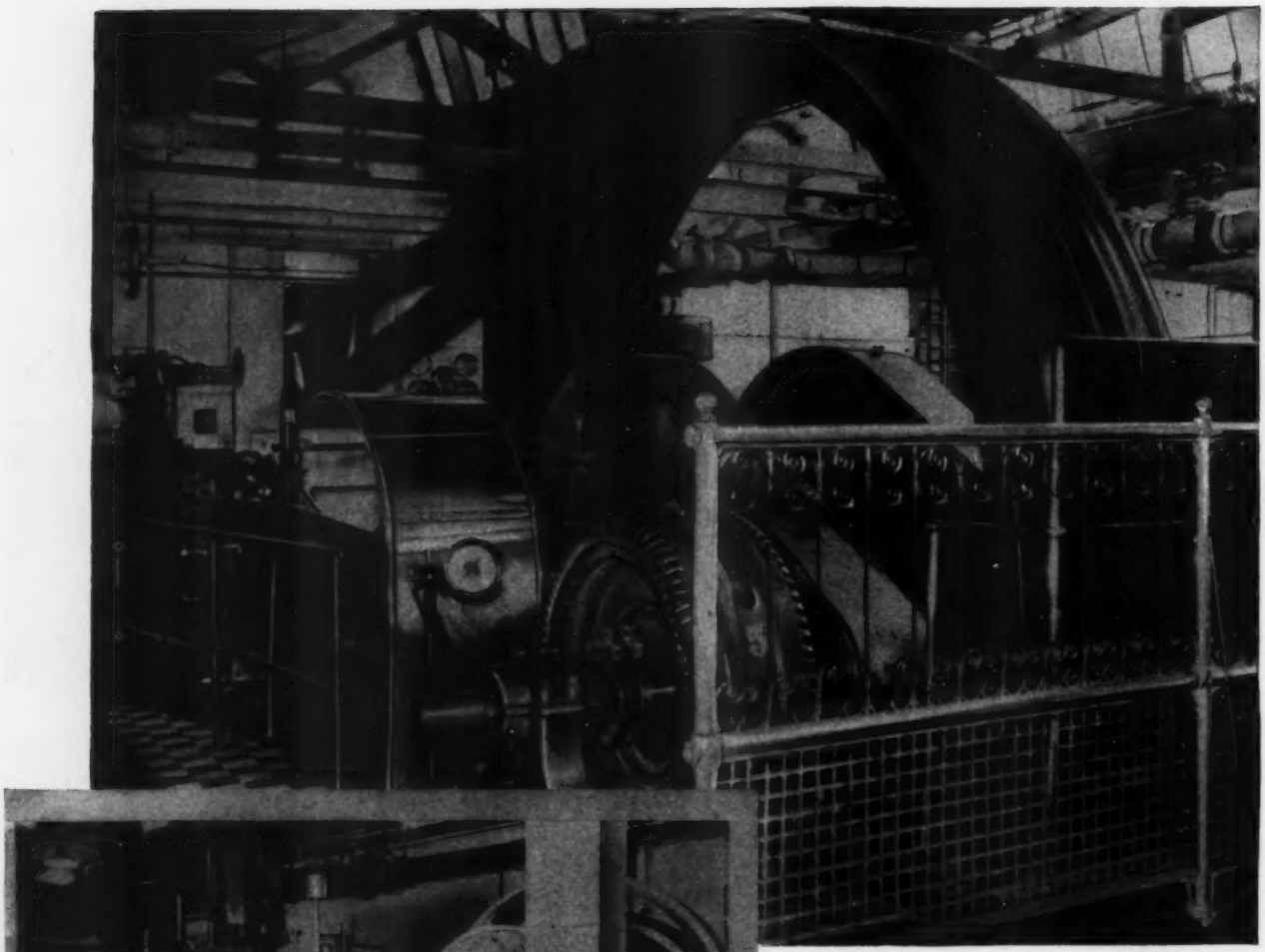
THE TAYLOR LIQUID LEVEL RECORDER, finest instrument of its type, is amazingly accurate and built to give long, trouble-free service. On permanent charts it shows clearly the liquid level changes which take place in the digester (and accumulator) and the reasons for them. The chart above was taken from a Taylor Liquid Level Recorder installed on a digester in daily service.

Taylor

Indicating Recording Controlling

TEMPERATURE, PRESSURE, FLOW *and* LEVEL INSTRUMENTS

WHERE



Running under back pressure, with exhaust steam used for heating dryer rolls, it is important to use an oil that separates quickly from steam. Then no oil will carry over to reduce drying efficiency of the rolls.

★ ★ ★

The requirements of your reciprocating engine may be very different from those of the Skinner Uniflow shown here. That's why Texaco manufactures 14 different steam cylinder oils.

TEXACO

EXHAUST STEAM

Must Heat Dryer Rolls...

PULP AND PAPER MILLS that make use of process steam are assured of *rapid* and *complete* separation of oil from this steam when they use the proper grade of Texaco Steam Cylinder Oil.

Texaco Steam Cylinder Oils atomize quickly and thoroughly, forming on metal surfaces an unbroken lubricating film that resists the temperature of super-heat, or the washing effect of saturated steam.

There are fourteen of these oils, each one particularly suited to a specific condition. Properly selected, they will reduce cylinder wear, stop groaning, eliminate interruptions.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Steam Cylinder Oils. Prompt deliveries assured through 2108 warehouse plants throughout the U. S.

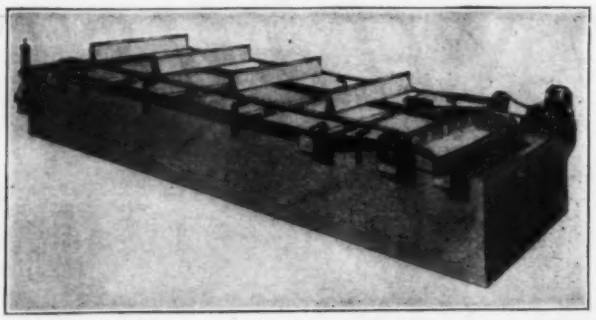
The Texas Company, 135 East 42nd Street, New York City.

Dryer rolls maintain high heat-conductivity only so long as the steam that heats them is free from oil. Use the proper Texaco Steam Cylinder Oil and be sure of quick separation.

TEXACO
REG. T. M.

STEAM CYLINDER OIL

STOP STREAM POLLUTION



and also keep the dollars in the mill

with the **SVEEN-PEDERSON**

FLOTATION RECOVERY SYSTEM

Operation can be observed at all times because the recovery tank is wide open—maximum elapsed time is not over 15 minutes for stock to return to the machine chest from the white water pit. The unit can be quickly and easily cleaned between colors when necessary. The recovery percentage with the Sveen solution is exceptionally high and the water discharged from the plant will conform to any local or state river pollution requirements. Write today for full details.

BULKLEY, DUNTON PULP CO., INC.

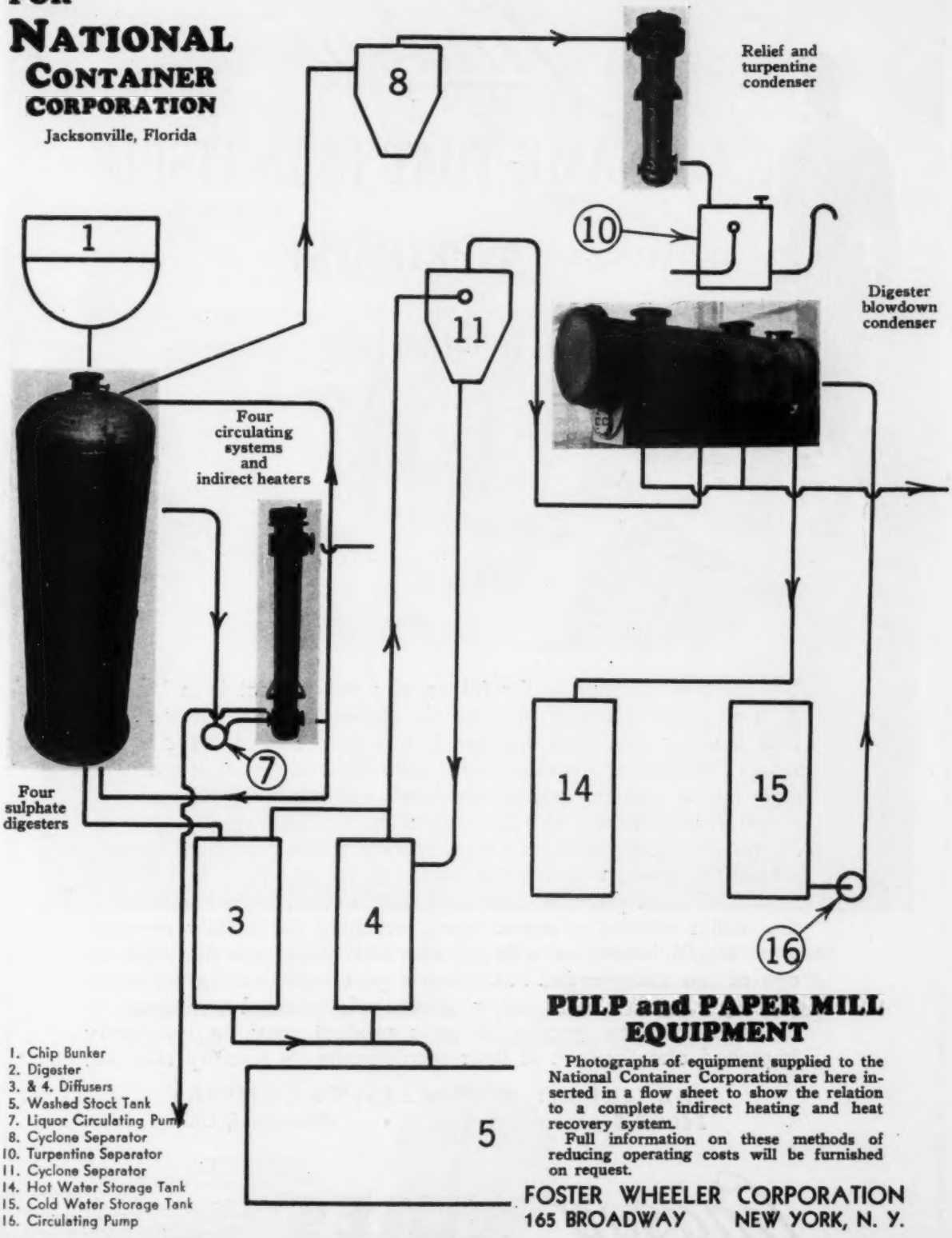
CAledonia 5-5260 to 69

295 MADISON AVE. NEW YORK, N. Y.

FOR

NATIONAL CONTAINER CORPORATION

Jacksonville, Florida



1. Chip Bunker
2. Digester
3. & 4. Diffusers
5. Washed Stock Tank
7. Liquor Circulating Pump
8. Cyclone Separator
10. Turpentine Separator
11. Cyclone Separator
14. Hot Water Storage Tank
15. Cold Water Storage Tank
16. Circulating Pump

PULP and PAPER MILL EQUIPMENT

Photographs of equipment supplied to the National Container Corporation are here inserted in a flow sheet to show the relation to a complete indirect heating and heat recovery system.

Full information on these methods of reducing operating costs will be furnished on request.

FOSTER WHEELER CORPORATION
165 BROADWAY NEW YORK, N. Y.

FOSTER WHEELER

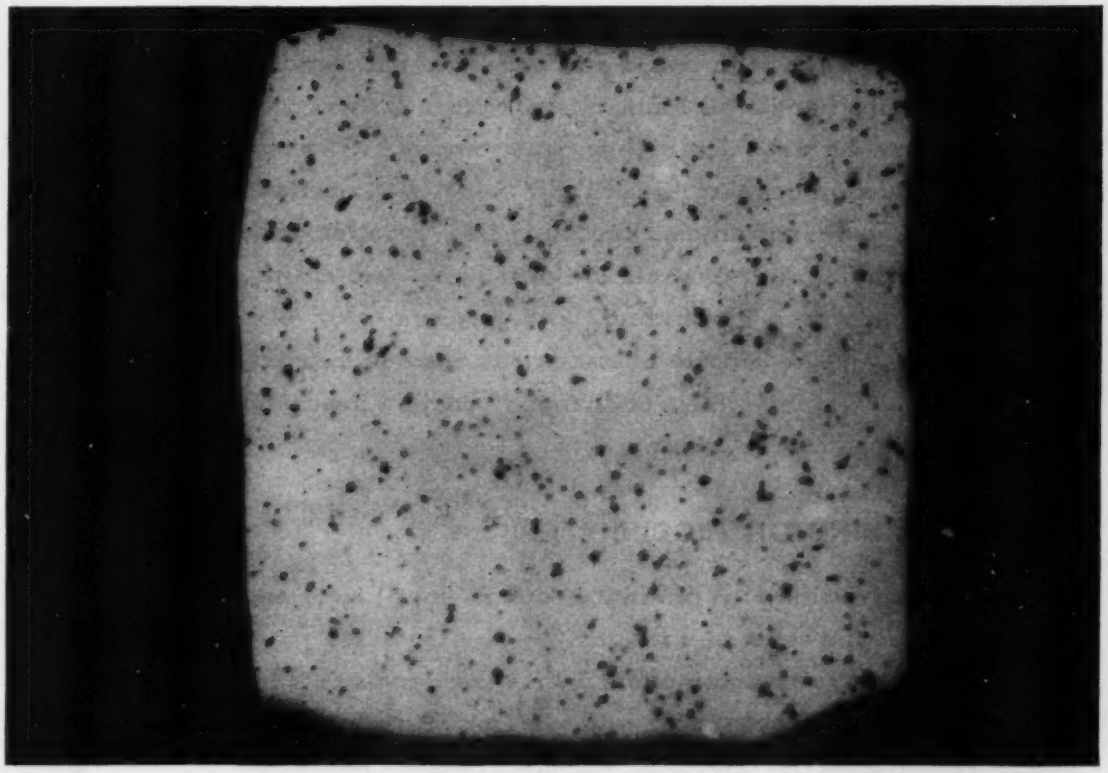
IF the past illuminates the future, you may expect from Lindsay a consistent effort to promote the manufacture of paper . . . In 1922 Lindsay produced the first Longcrimp Fourdrinier Wires, which type set new standards for wire life and performance. The grooving of suction boxes has been minimized by the use of Spiral Weave Wires, also introduced by the Lindsay organization. Equipment for surfacing wires, a process which has since become almost universal, was likewise perfected by Lindsay. And over a stretch of three decades Lindsay research men have transformed the earlier stitched or sewed seam, watching the modern stronger type, sewed, brazed or welded, take form under the all-revealing eye of the microscope . . . Lindsay's past contributions to paper making may be taken as a pledge of renewed endeavor, to the end that the quality of your product may be constantly improved and the cost of your manufacture as steadily reduced.

THE LINDSAY WIRE WEAVING COMPANY
14025 Aspinwall Avenue • Cleveland, Ohio

RAYOX

PURE TITANIUM DIOXIDE

showing extremely fine particle size

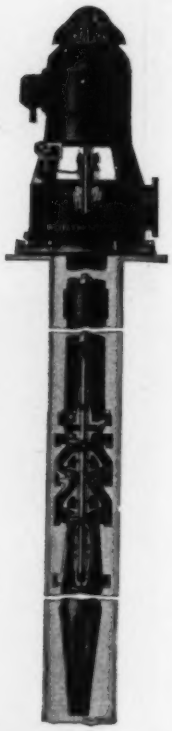


This photograph shows one opening of a 325 mesh screen magnified 4,000 times. The opening is approximately 1/100,000th of a square inch. The dark spots are Rayox particles shown in comparison to the size of this extremely fine opening

R. T. VANDERBILT CO., INC. RAYOX AMERICAN PRODUCTS

R. T. VANDERBILT CO., INC • 230 PARK AVENUE, NEW YORK

WORTHINGTON EQUIPMENT FOR



Deep well turbine pump for water supply

WORTHINGTON CENTRIFUGAL PAPER STOCK PUMPS...

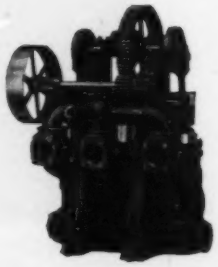
WORTHINGTON paper stock pumps have been specifically developed to meet the requirements of the paper mill engineers. They have been tested and proved in mill service.

These pumps handle all kinds of stock up to 6½% consistency, and can be used for higher consistencies in special cases. Large suction opening insures low velocity and permits low submergence. Unobstructed incoming flow, together with the large streamline flow channel of the impeller and casing, prevents clogging and air-binding, with resulting high efficiency. A steep head-capacity characteristic insures approximately constant flow regardless of change in suction head, and prevents overloading the driver.

OTHER WORTHINGTON PRODUCTS...

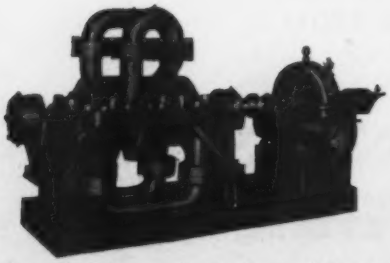
A comprehensive line of Worthington pumps, in all sizes and types, provides the exact unit for any paper mill service.

In addition, Worthington offers many other products of importance to the industry... *air and gas compressors, steam condensers, steam-jet ejectors, vacuum pumps, feedwater heaters, steam turbines, liquid meters, Diesel and gas engines, and V-belt drives.*

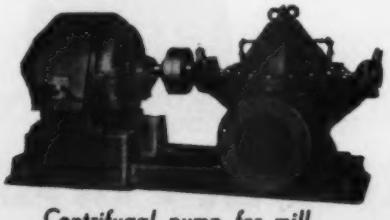


Reciprocating stock pump

• *Descriptive literature on any product furnished on request*



Centrifugal pump for boiler feed service

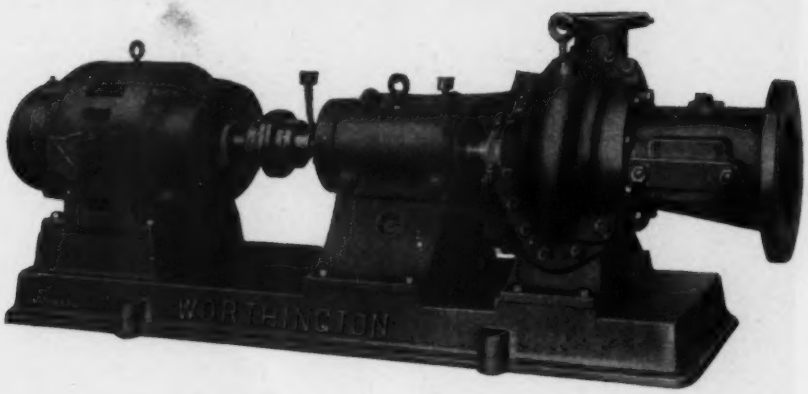


Centrifugal pump for mill supply and general service

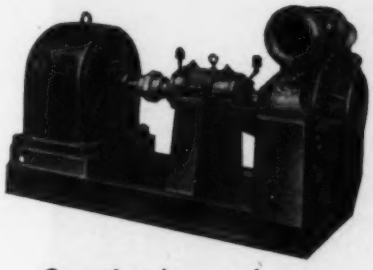
Monobloc centrifugal pump for general service

THE PAPER INDUSTRY

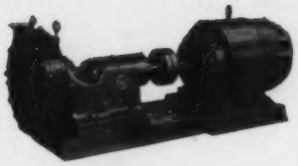
Centrifugal pump for chemicals, acids, and caustic solutions



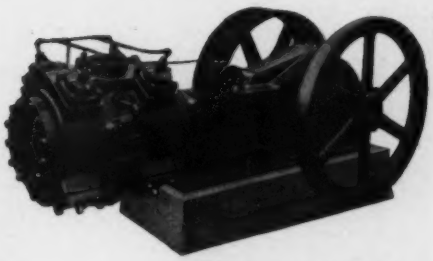
Paper stock pump with casing of special metal . . . and arranged for belt or motor drive



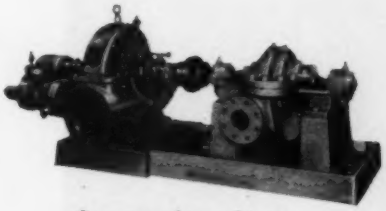
Centrifugal pump for sulphite digester service



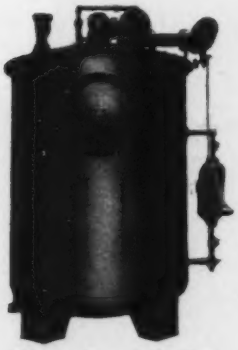
Centrifugal pump for black liquor service



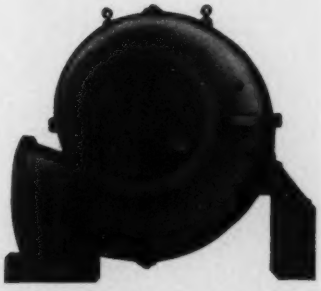
Horizontal single-stage air compressor



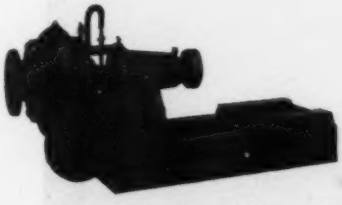
Steam-turbine-driven centrifugal pump



Vertical steel-shell feedwater heater



Centrifugal pump for general circulating and stock agitating service



Centrifugal pump for green liquor service

Multi-V-Drive

WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: **HARRISON, NEW JERSEY** - *Branch Offices and Representatives in Principal Cities throughout the World*

ICS-9A

WORTHINGTON

The Thousandth Norton Pulpstone

Since Norton introduced the revolutionary artificial pulpstone more than a thousand Norton Pulpstones have been delivered to the mills of the wood pulp industry.

★ Lewellen ★

VARIABLE SPEED TRANSMISSIONS

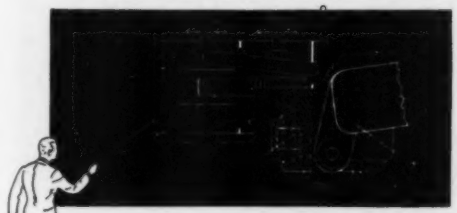
THE FINEST FEATURES MONEY CAN BUY

● Study these exclusive Lewellen features—make your own comparisons—frankly, GET THE FACTS. You'll find, there is no other Speed Transmission on earth that has the same source of brilliant behavior—the same outstanding features that, after all, mean years of trouble-free, dependable service.

A Lewellen Variable Speed Transmission in the drive of every production machine is a definite way to improve your manufacturing operations and to INCREASE YOUR PRODUCTION. The Lewellen is an extremely flexible unit that may be adapted to any variable speed control problem.

LEWELLEN SERVICE

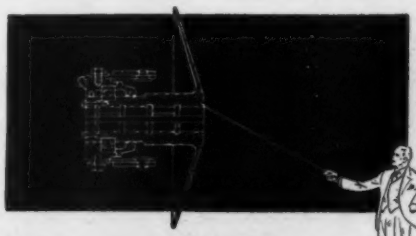
To you, Mr. Manufacturer, we offer a service that entails invention, development, counsel, and creative co-operation. Our engineers are ready to be helpful.



LEVER & LINK SUSPENSION

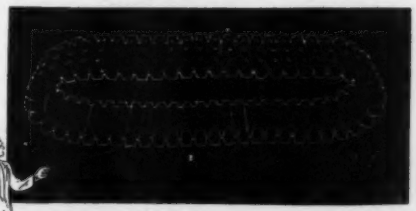
Flexible bearing suspension is self-aligning in every direction. The thrust bearing load is equally distributed upon every ball in the bearing, at all speeds, and while changing speeds. This is another *exclusive* Lewellen feature.

ANOTHER IMPORTANT FEATURE is the mounting of thrust bearings at the outer end of the disc hub. The bearing housing is bolted to the disc hub. When the lever moves away from the disc, it moves the disc positively and does not require the belt to force the discs apart.



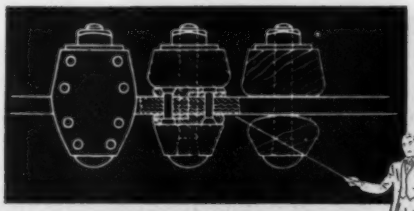
DISC LUBRICATION

A patented lubrication system for disc hubs, keys, and shafts. Simple, positive, and highly efficient. A series of annular grooves are cut in the bore of the disc hub. These grooves are connected on alternate sides of the key by channels, forming one continuous grease passage. Only a small movement of the disc upon the shaft is necessary for complete lubrication. With a minimum amount of attention, sticking or "freezing" is impossible, thus eliminating expensive repairs and replacements.



DOUBLE BLOCK BELT

The unit or single tip covers the ends of both inner and outer blocks as well as the space between these blocks—a distinctive feature. This single tip adds materially to the area of contact between the belt and disc face, thus greatly reducing the necessary tension upon the belt, bearings, and shafts.



UNBREAKABLE BELT SPLICE

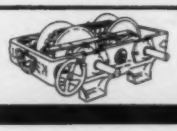
Riveted to each end of the belt are lightweight splice plates drilled with holes that exactly match the specially finished heads of the rivets in the opposite plate. The splice block and bolts hold these plates rigidly in place while the entire load on the belt is transmitted through the rivet heads and splice plates.

Get this important fact... **There's a Lewellen Transmission to meet your need for variable speed control**

Here's one of the most important steps you can take toward modernization. The right speed at the right time with Lewellen Variable Speed Transmissions and Automatic Controls means accurately increased production—positive flexibility to meet changes in production schedules—the exact speed in response to changes in size, condition, or character of the materials being processed.

Call a Lewellen representative or write us NOW!

LEWELLEN MANUFACTURING CO.
COLUMBUS, IND.



A $250.00 Lewellen Transmission multiplies the capacity of a $40,000.00 Traveling Oven by making it possible to bake a a wider variety of products.

A Lewellen installation upon a Double Cutter cost a paper mill $1291.50 including all changes in their old drives. They estimate their savings at $10,602.50 the first year.

WESTINGHOUSE

from saw mill to tester

In new plant of Chesapeake Camp Corporation

Modern in every detail is this new 150 ton Kraft pulp and paper plant, at Franklin, Virginia.

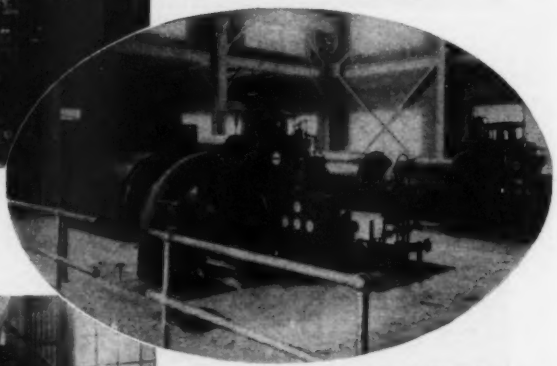
Working side by side with J. E. Serrine & Co., Consulting Engineers, and Rust Engineering Co., General Contractors, Westinghouse designed and installed complete electrification. Once again, Westinghouse establishes its place as "Partner of the Paper Industry."

These same engineers, with special training in the problems of the paper industry, are available to help you with your electrification problems. Address Westinghouse Electric and Mfg. Company, East Pittsburgh, Pa., or the local office.

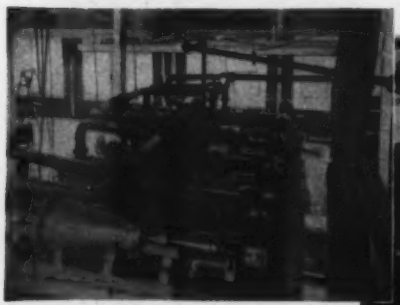
Four Nash vacuum pumps, each driven by 100 hp., 865 rpm., 2200 volt splash proof squirrel cage induction motor.

Sectional paper machine drive, looking from driving side, from calendars toward wet end of machine.

Sectional direct automatic control, with one of distribution centers in background.

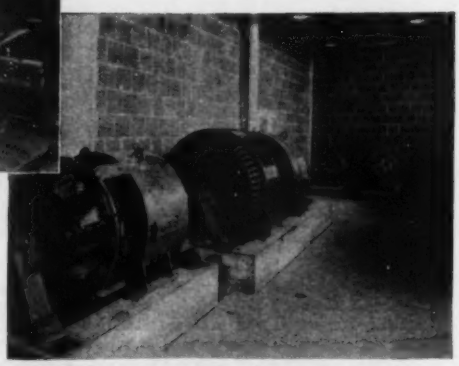


Power house for plant and saw mill, showing main turbine generators and switchboard.



E. D. Jones Majestic Jordans, powered by 5-400 hp., 400 rpm., 100% power factor, 2200 volt synchronous motors.

DJ Murray Chipper, run by 250 hp., 257 rpm., 80% power factor, 2200 volt synchronous motor.



Sectional paper machine drive motor generator set with coupled braking generator. Also master set, exciter set and winder motor generator set.

Westinghouse

ELECTRICAL PARTNER OF THE PAPER INDUSTRY

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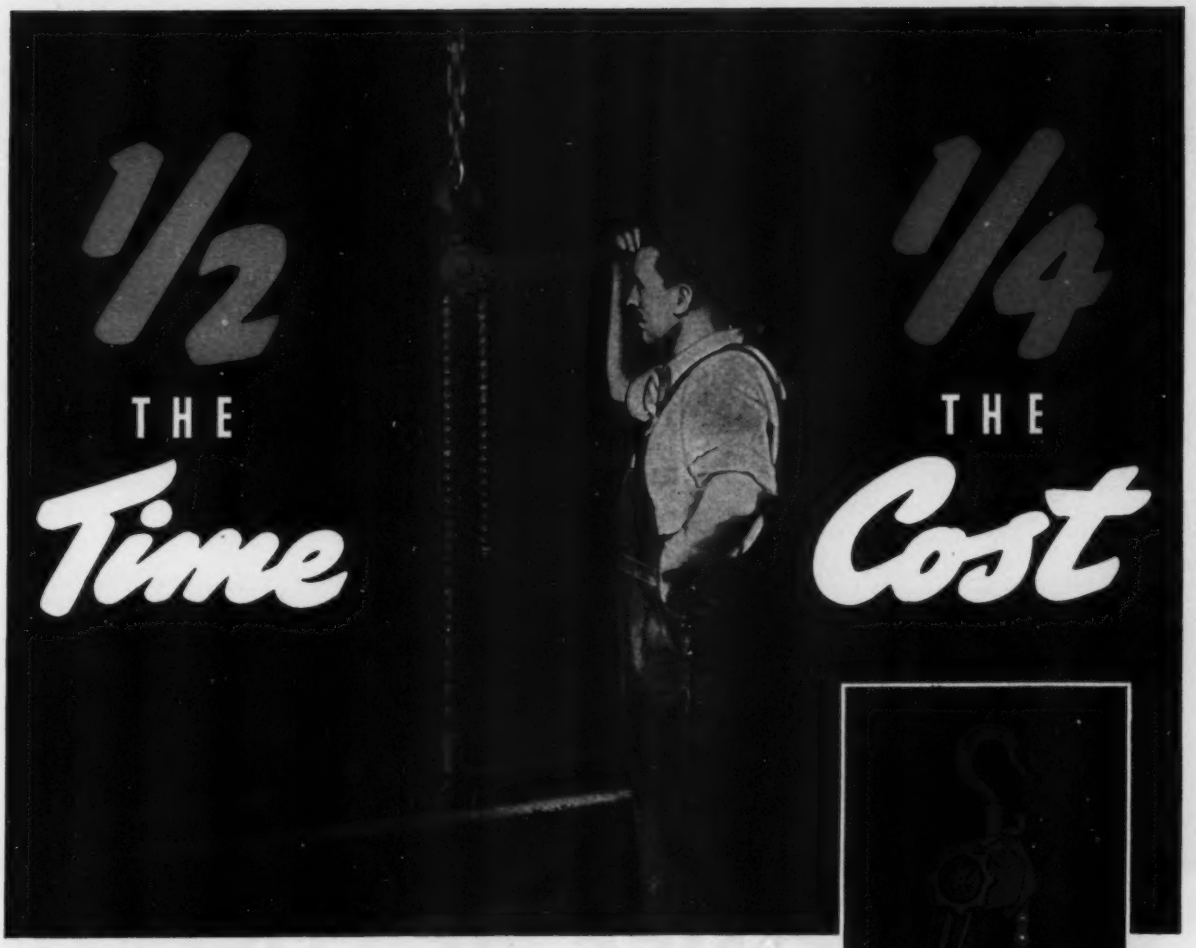


WITH A PUL-LIFT ON THE JOB

That's the record hung up by Charles Hennings, New York City elevator repair contractor, using a ton-and-a-half Pul-Lift on various elevator jobs.

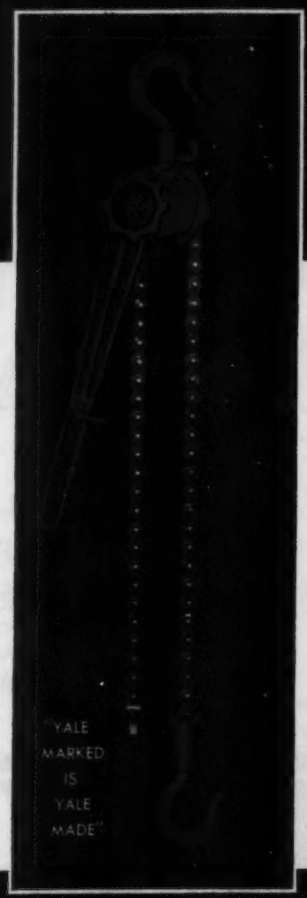
But that isn't all! Mr. Hennings comments with amazement on the strength of the special alloy roller chain—the safety provided by the positive action of the Weston Load Brake—the amazing lightness of weight—the ready adaptability to close headroom—the ease of operation—the ridiculously low cost of maintenance. We quote excerpts from his letter:

> "I used the Pul-Lift—was able to reduce by 50% the time ordinarily required to do a job of this kind—also eliminated 25% of the cost. The Pul-Lift is different from anything I have ever seen—This is the easiest hoist I have ever operated, *and I don't care what make is specified.*"

Such enthusiasm coming from an unbiased user must have some reason behind it. And it has!

Adaptable to either the horizontal or vertical position—the Pul-Lift is a remarkable tool that can do almost anything. Stretching cables—pulling machinery—placing masonry—general repair work . . . All are in the scope of this amazing hoist. And in addition, the Pul-Lift is light enough to be easily portable! No tool chest should be without it. Capacities ¾, 1½, 3 and 6 tons.

For further information, contact your nearest YALE distributor.



TRADE **YALE** MARK

THE YALE & TOWNE MFG. CO.
PHILADELPHIA DIVISION, PHILADELPHIA, PA., U. S. A.
IN CANADA: ST. CATHARINES, ONT.

THE JONES-BERTRAMS PATENT BEATER

Wide Limits of Hydrating. Wide Limits of Cutting.
Large Power Savings. Automatic Roll Adjustment.
Duplication of Beating Cycles. Saving in Floor Space.

Mill men are invited to see and test this 1,000 lb. Beater (illustrated above) at the Jones Laboratory.

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.
Builders of Quality Machinery for Paper Mills

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INVESTMENTS ARE SAFE WHEN FOURDRINIERS RUN

ON SKF'S

BUILT BY THE BAGLEY & SEWALL CO.
SKF-EQUIPPED

Here's a machine that represents a BIG investment in any mill—too big to be jeopardized by the non-performance of any of its parts.

So Bagley & Sewall use SKF Ball and Roller Bearings to give long life to wires, press and dryer felts . . . suction press rolls . . . dryer cylinders.

In fact, they've protected every rotating part with an SKF Bearing. And why not? They've used SKF's before. 4051

SKF INDUSTRIES, INC.
Front St. & Erie Ave. Phila., Pa.

SKF makes more types and sizes of ball and roller bearings than any other manufacturer in the world.

YOU already have your power generating equipment, you know its efficiency and can do little with it to further reduce the cost of producing power. Coal too, F.O.B. cars, is a constant. The variable elements are the costs of handling coal from car to stoker and handling ashes from grate to car. Robins designs and builds standard and special equipment for this purpose. Power plants buy it because of estimated savings in the cost of producing power. Let a Robins engineer call and tell you whether Robins can or cannot reduce your cost of handling coal and ashes.

The various pieces of Robins Coal, Ash and Wood Chips Handling Equipment are described in separate bulletins. Send for bulletins of interest to you.

ROBINS MAKES

BELT CONVEYORS
PIVOTED BUCKET CONVEYORS
BUCKET ELEVATORS
CRUSHERS FEEDERS
WEIGH LARRIES
SKIP HOISTS GATES

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I would like as indicated: Representative call ( ); Bulletins describing .....

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pedigreed printing papers

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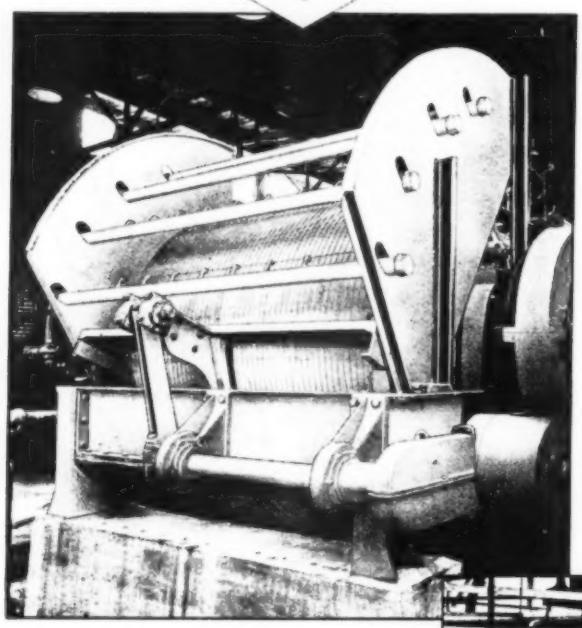
IN THE NEW MILL OF THE

Chesapeake-Camp Corporation

IMPCO

EQUIPMENT HANDLES STOCK



with high maximum tonnage at lowest power comsumption

"IMPCO" equipment furnished for the splendid new mill of Chesapeake-Camp Corporation consists of —

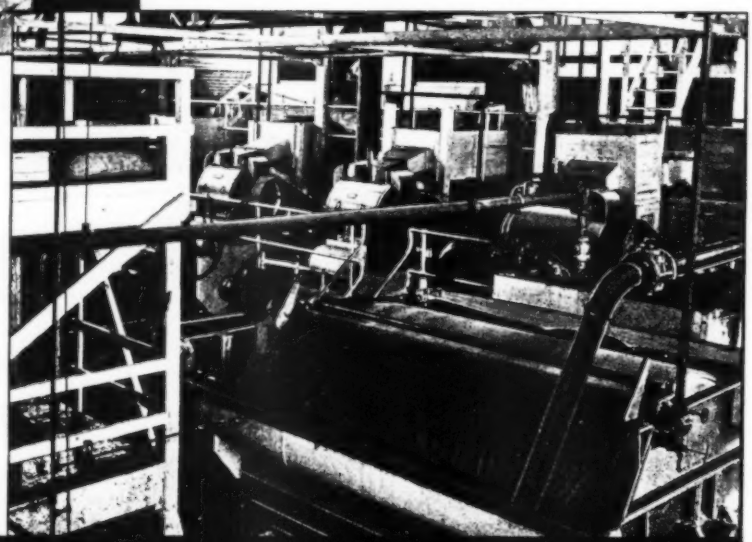
2 KNOTTERS

4 CENTRIFUGAL SCREENS

1 VACUUM THICKENER

1 VACUUM SAVE-ALL

1 VACUUM LIME SLUDGE FILTER



IMPROVED PAPER MACHINERY CORPORATION

Nashua, New Hampshire

OPACITY · WHITENESS · BRIGHTNESS

ENVELOPE STOCKS

require OPACITY, WHITENESS and BRIGHTNESS such as Titanox pigments give

Envelope makers report an interesting revival in demand for better envelopes—made from stocks which are completely opaque and brilliantly white. How to meet this demand without increasing weight is a problem for paper manufacturers.

But it really is not much of a problem because Titanox pigments have solved it already. The exceptional opacity, whiteness and brightness of these pigments permit the production of light weight papers with a minimum of show-through, with desirable whiteness and brightness, and with fine texture. Only a small loading is required, leaving the strength of the paper unimpaired.

Titanox pigments are chemically inert, have small particle size and are readily dispersible, all of which makes for easier working.

For LIGHT WEIGHT Stocks

TITANOX-A gives the best results in papers where low ash and high strength are of primary importance. It is pure titanium dioxide, the most opaque and whitest white pigment obtainable. It gives desired results with low pigmentation.

For HEAVIER Stocks

TITANOX-B-30 (Titanium Barium Pigment) is effective and economical in papers which permit higher pigment loading. It contributes to opacity, color and brightness without increasing weight.

Our Technical Service Department will be glad to show you how these modern pigments will benefit your envelope stocks.

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TRADE MARK

PRECISION DRYER FELTS

Cost less per Ton of Paper . . . *Specify* RICHLAND TRIPLEX

Whatever the speed of your paper machines, RICHLAND TRIPLEX dryer felts mean low relative costs per ton of paper. They are woven with such unfaltering uniformity from yarns tested to such rigorous micrometric tolerances that they can be described only as precision fabrics. Every square inch of every felt tests to a remarkable degree of uniformity with every other square inch. Shrinkage and stretch have been reduced to a minimum requiring less adjustments, fewer stops . . . making more and better paper. Specify RICHLAND TRIPLEX precision dryer felts, all cotton or asbestos.

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REDUCING COSTS IN PAPER MILLS

Special DODGE-TIMKEN Cylinder Mould Bearings as applied on a paper board machine.

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A symbol of quality for any piece of equipment with which it is associated

"Mercury." New York Central Lines . . . . one of the latest Timken-equipped Streamliners

From one end of modern paper mills to the other . . . in every manufacturing process from pulp-making to super-calendering, TIMKEN Roller Bearings are saving time, power and lubricant. In short—they are cutting costs and increasing profits.

If your production is slow, if your power and lubrication bills are too high and if your maintenance costs are excessive, consult Timken engineers or your equipment builder.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
TAPERED ROLLER BEARINGS

DE LAVAL

FROM its inception this company has specialized on steam turbines and gears and centrifugal machinery of the same general characteristics and requiring the same type of equipment, methods and skill for its production.

STEAM TURBINES

Of the impulse type, single-stage, velocity-stage and pressure-stage types, and for all steam conditions, including high pressure, condensing, back pressure, bleeder and low pressure and mixed-flow service. Specifically adapted to modern high pressure, high temperature steam.

CENTRIFUGAL PUMPS

Single-stage and multi-stage, for all deliveries and heads, from small motor-mounted pumps up to the largest water works pumping units and feed pumps for high pressure boilers.

Also propeller pumps for large volume, low head service and the De Laval-IMO rotary displacement pumps for oil.

BLOWERS and COMPRESSORS

Single-stage and multi-stage, for all capacities and for pressures up to 100 lbs., including blast furnace blowers, gas exhausters and boosters and compressors for ore flotation and activated sludge treatment of sewage, etc.

SPEED REDUCING GEARS

Of the double helical type, as for driving D.C. and A.C. generators, large pumps and blowers, ships' propellers and other slow and moderate speed machinery. Worm Gears for motor or turbine drives of various classes of machinery and under adverse conditions of grit, moisture, shock loads, etc.

Special catalogs upon request

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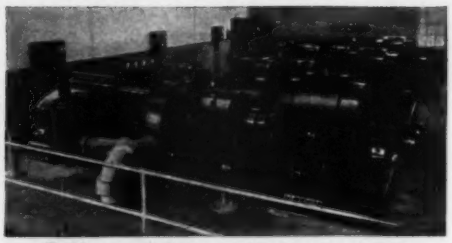
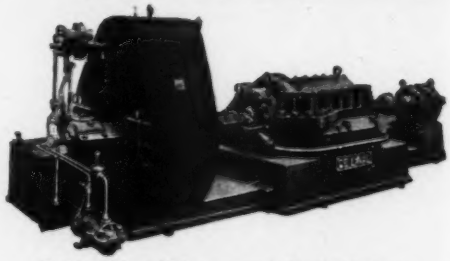
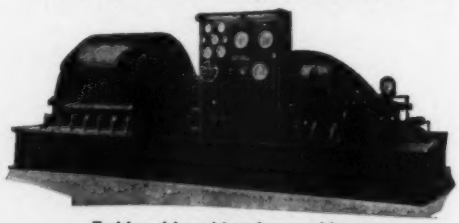


Turbines producing power from process steam

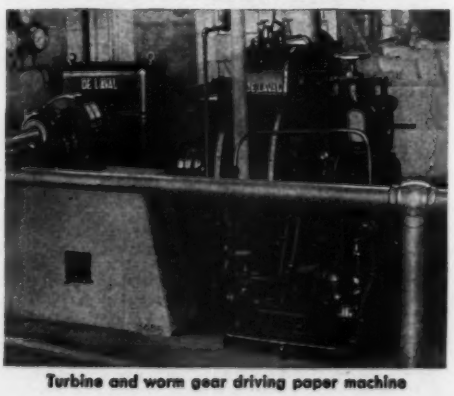
Geared turbine driving forced draft fan



Turbine driven high pressure boiler feed pump



Turbine driven blast furnace blower



Turbine and worm gear driving paper machine

This Simple Fact...

The SHAPE CHANGE in a bending V-BELT

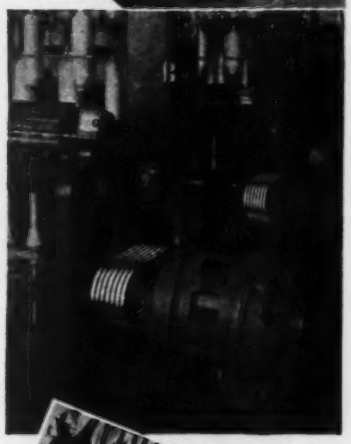
Shows Why You Want V-Belts With the Patented

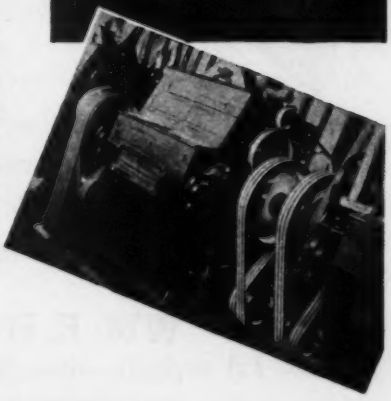
Concave Side

When *any* V-belt bends around its pulley, the top of the belt is under tension and grows *narrower*. The bottom, under compression, *widens*. A a result of these two changes, the sides of the belt *bulge out*. If the sides were *straight* to begin with, they are now forced into a shape that does not fit the sheave groove—as shown in figure 1, below.

Figure 2 shows how this shape change is corrected by the patented *concave side*. The top narrows, the bottom widens—but there is no side-bulge. This insures uniform side-wall wear which means *longer life*. Moreover, the full side-width grip on the pulley carries heavier loads without slippage; which saves belt wear and also saves power!

The Gates Vulco Rope is the only V-Belt built with the patented concave side.





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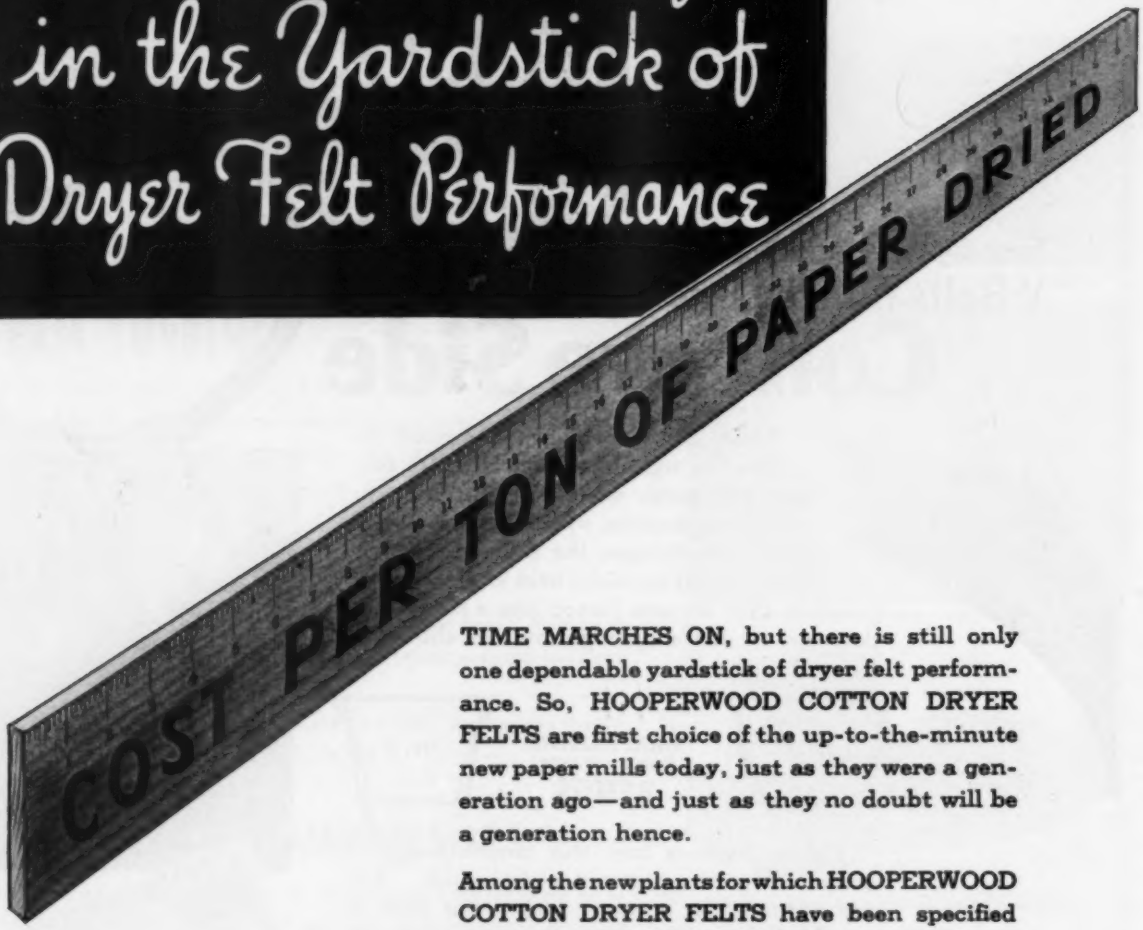
GATES VULCO ROPE DRIVES

There's no change in the Yardstick of Dryer Felt Performance



TIME MARCHES ON, but there is still only one dependable yardstick of dryer felt performance. So, **HOOPERWOOD COTTON DRYER FELTS** are first choice of the up-to-the-minute new paper mills today, just as they were a generation ago—and just as they no doubt will be a generation hence.

Among the new plants for which **HOOPERWOOD COTTON DRYER FELTS** have been specified on recent orders are the following:

CHESAPEAKE-CAMP CORPORATION, Franklin, Virginia
ST. JOE PAPER COMPANY, Port St. Joe, Florida
UNION BAG & PAPER CORP., Savannah, Georgia
CROSSETT PAPER MILLS, Crossett, Arkansas

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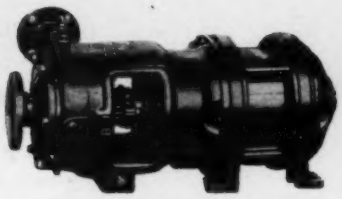
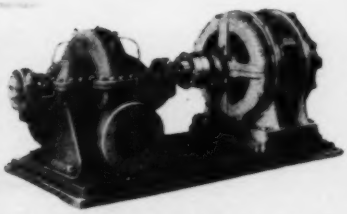
HOOPERWOOD ASBESTOS AND COTTON DRYER FELTS

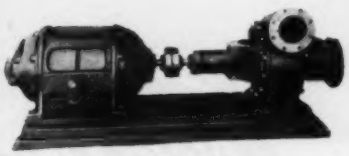
1. Goulds Fig. 3185 Centrifugal Paper Stock Pump.



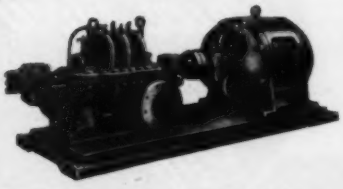
2. Goulds "Close-Coupld" Centrifugal Pumps.



3. Goulds Double Suction Centrifugal Pumps.



4. Goulds Agitator Pumps.



5. Goulds Multi-Stage Centrifugal Pumps.

6. Goulds Fig. 3085 Chemical Pump.

FOR THE PAPER INDUSTRY ...NEW ECONOMIES

Long before the dawn of this century, Goulds was building pumps for the paper industry. That experience—coupled with alert, progressive development—stands behind the carefully engineered Goulds units that today are producing new economies in paper mills throughout the world.

Advanced design, carefully selected materials, and the production facilities of the world's largest manufacturer of pumps are embodied in every Goulds Unit. This combination assures you of new economy and greater dependability when you specify Goulds.

Write today for Bulletin 206. It gives full data on Goulds pumps for the paper industry—a complete line that covers your every liquid-handling job with maximum efficiency.

GOULDS PUMPS Inc.

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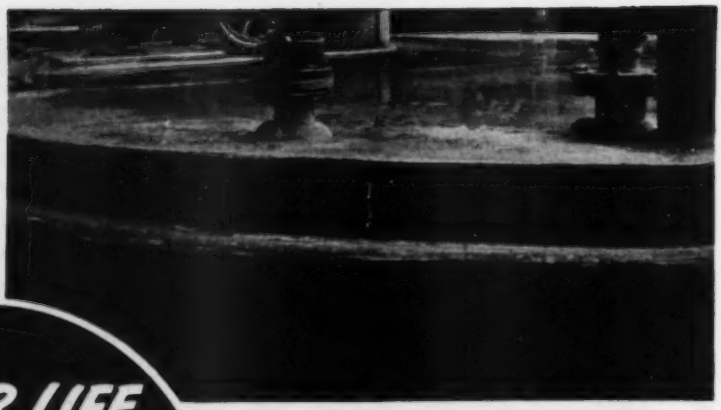


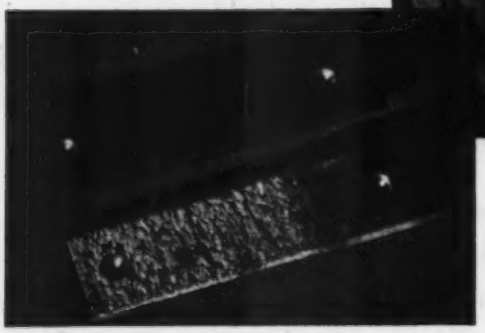
LONGER LIFE
for your tank linings, coils and pipe
TELLURIUM LEAD

NO REPAIRS

Tellurium Lead is now extensively used for coils and pipes and to line tanks in plants handling corrosive acids. One manufacturer who has used Tellurium Lead in a dilute sulphuric acid solution writes: "Coils previously used gave comparatively short service (about six months). Tellurium Lead coils have been operating continuously 24 hours a day for a year. As yet no blowouts have occurred nor have any repairs been necessary."

MORE STRENGTH AT BENDING POINT

When bent, stretched or hammered, Tellurium Lead actually becomes stronger. Result—turn-over points and joints are less subject to cracking. Furthermore, where vibration occurs, this capacity to develop latent strength minimizes buckling and creeping.



LESS CORROSION

"We lined one of our tubs with your Tellurium sheet lead. After eight months, there are no signs of the lead creeping and it shows very little if any corrosion due to the action of the 10% boiling sulphuric acid. It promises to have a much longer useful life than the lead previously used."

New Low Price Now in Effect

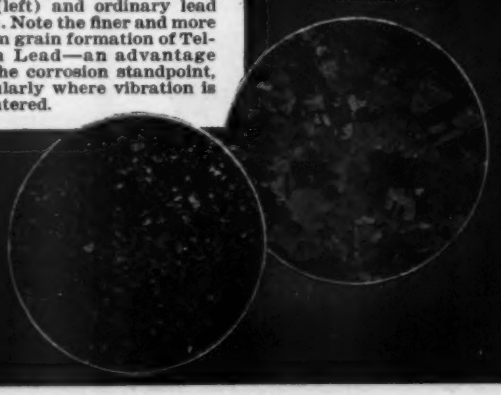
GREATER ACID RESISTANCE

Illustration above shows strips of lead with and without tellurium content after immersion in 96% sulphuric acid at 305° C for 3 minutes. Tellurium Lead weight loss, 0.97% —other lead 5.11%. Laboratory results such as this have now been verified by plant service in many industries.

Tellurium Lead of our manufacture is time-tried St. Joe chemical lead alloyed with a small quantity of Tellurium. It gives the advantages of this well-known chemical lead plus important new ones. Yet now, due to a price reduction, it costs only a fraction of a cent more per pound than chemical lead. Available in sheets, pipe and coils. For further facts, write to nearest branch.

DENSER STRUCTURE

Photomicrographs of Tellurium Lead (left) and ordinary lead (right). Note the finer and more uniform grain formation of Tellurium Lead—an advantage from the corrosion standpoint, particularly where vibration is encountered.



NATIONAL LEAD COMPANY

New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co., Pittsburgh; Georgia Lead Works, Atlanta; Gibson & Price Co., Cleveland; American Lead Corp., Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Co., Ltd., Toronto, Montreal, Winnipeg, Vancouver.

CO-ORDINATES ALL 4 IN PROCESS CONTROL....

In process control—the lack of co-ordination in regulating such variables as temperature, pressure, flow and liquid levels, inevitably results in unbalanced operation—with resultant loss in time and increased costs.

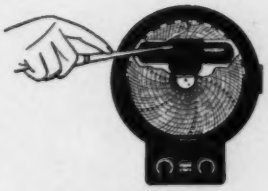
Brown Air-o-Line provides this co-ordination: First, by the simplicity with which Air-o-Line is "tuned in" to process control. Second, by the extreme precision with which it maintains control. The Brown Air-o-Line Controller has reduced the most complicated process control problem to the simplicity of dialing a radio.

Air-o-Line is easily adapted to any process control problem. All that is necessary is to set the "Control Index" at the desired point, then a slight turn of a screw-driver aids the operator to "tune in" for "Throttling Range and Automatic Reset"—quickly and precisely, without guesswork.

Once "tuned in", Air-o-Line is fully automatic. It "Recognizes", "Analyzes" and "Corrects" any departure from the desired point without "hunting", "cycling", "drifting" or "shifting" of the control setting.

With Air-o-Line controlling your processes you always get the best results—not just "good enough". Air-o-Line responds instantly to pen movements of less than 1/10 of 1% of full scale. It can make pressure changes, for example, as small as .01 lb. per square inch, or 1/4-inch water pressure at the control valve.

Write for Catalog No. 8902. THE BROWN INSTRUMENT COMPANY, *a division of Minneapolis-Honeywell Regulator Co.*, 4489 Wayne Avenue, Philadelphia, Pa. Offices in all principal cities. Toronto, Canada: 117 Peter Street —Amsterdam-C, Holland: Wijdesteeg 4—London, England: 70 St. Thomas' Street, S.E. 1.

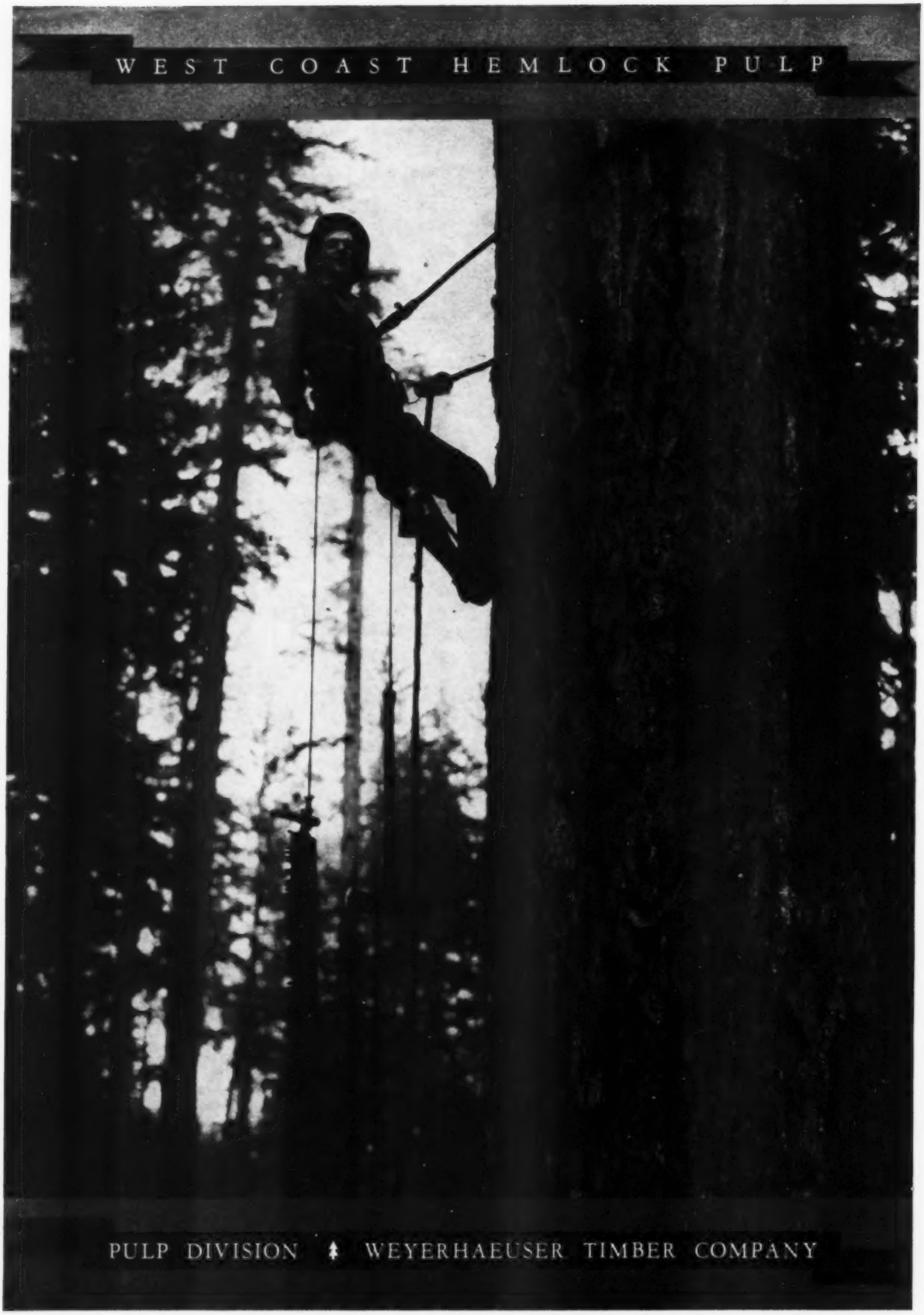


"THROTTLING RANGE DIAL"—graduated from 1% to 150%, gives throttling range that is sufficient to provide the flexibility required for any control problem.

"AUTOMATIC RESET DIAL" — also graduated, makes it possible to change the rate at which the control point is automatically reset. No resistance tubing is used.

BROWN AIR OPERATED CONTROLLERS

OUTSTANDING PERFORMANCE WITH SIMPLICITY


WEST COAST HEMLOCK PULP
PULP DIVISION ♦ WEYERHAEUSER TIMBER COMPANY

★ SUPERIOR CHEMICALS

SUPERIOR PMC CHEMICALS

for Paper Makers

★ ROSIN SIZE

★ SATIN WHITE

★ PARAFFIN EMULSIONS

★ CASEIN

★ CASEIN SOLVENTS

★ SULPHONATED OILS

★ PINE OILS

★ ANTI-FROTH OIL

★ WAX SIZES

1913 · SERVING INDUSTRY · 1938 — 25th Anniversary Year

Paper Makers Chemical Division

HERCULES POWDER COMPANY
Incorporated

Kalamazoo, Michigan

BRANCH OFFICES:

Stoneham, Mass.
Holyoke, Mass.
Providence, R. I.
Albany, N. Y.
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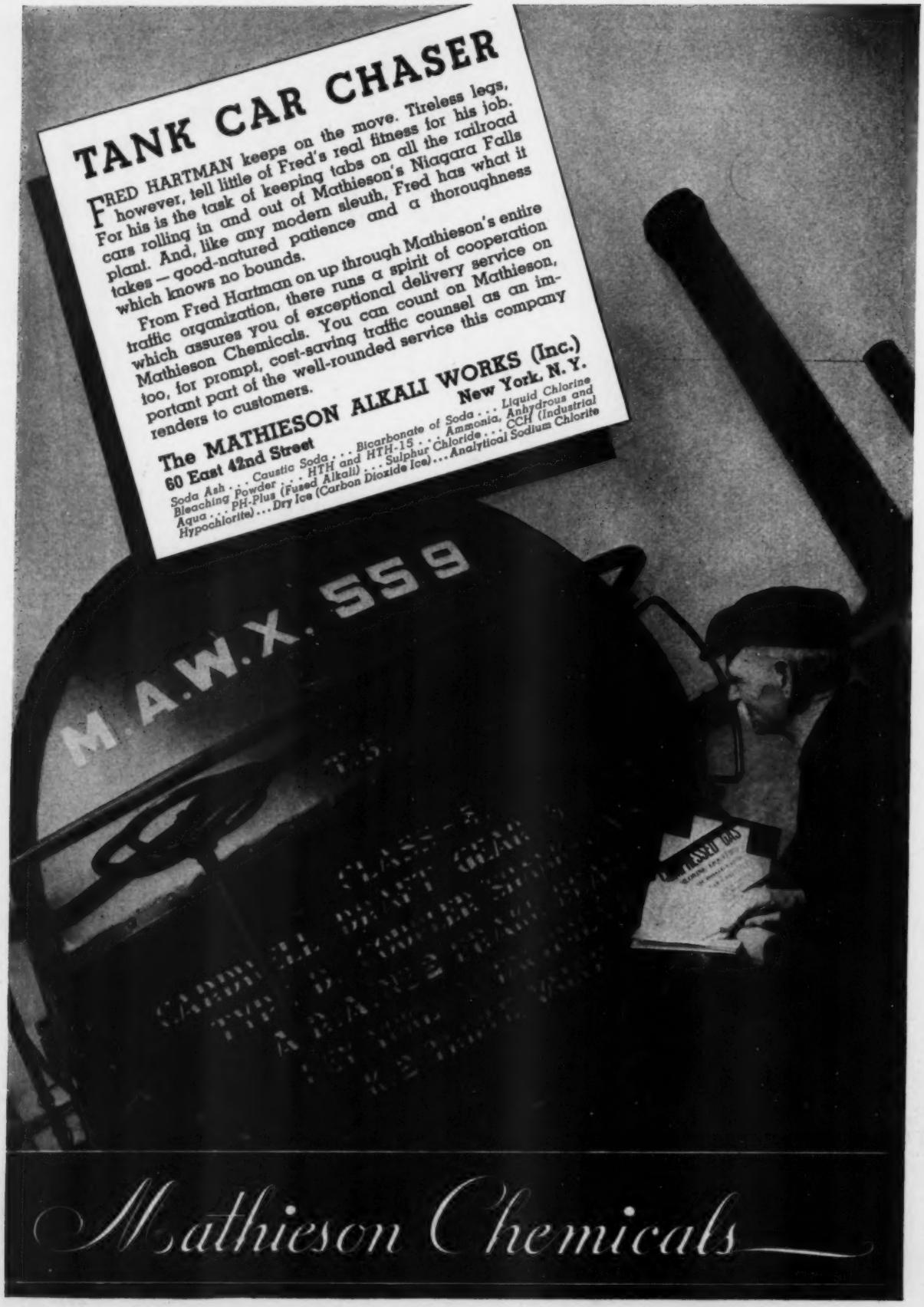
Savannah, Ga.
Jacksonville, Fla.
Pensacola, Fla.
Marrero, La.
Kalamazoo, Mich.
Milwaukee, Wis.
Chicago, Ill.
Portland, Ore.
San Francisco, Calif.
Freeman, Ont.
Erith, England

PM-55


TANK CAR CHASER
FRED HARTMAN keeps on the move. Tireless legs, however, tell little of Fred's real fitness for his job. For his is the task of keeping tabs on all the railroad cars rolling in and out of Mathieson's Niagara Falls plant. And, like any modern sleuth, Fred has what it takes — good-natured patience and a thoroughness which knows no bounds.
From Fred Hartman on up through Mathieson's entire traffic organization, there runs a spirit of cooperation which assures you of exceptional delivery service on Mathieson Chemicals. You can count on Mathieson, too, for prompt, cost-saving traffic counsel as an important part of the well-rounded service this company renders to customers.
The MATHIESON ALKALI WORKS (Inc.)
60 East 42nd Street New York, N. Y.
Soda Ash . . . Caustic Soda . . . Bicarbonate of Soda . . . Liquid Chlorine
Bleaching Powder . . . HTH and HTH-15 . . . Ammonia, Anhydrous and
Aqua . . . PH-Plus (Fused Alkali) . . . Sulphur Chloride . . . CCH (Industrial
Hypochlorite) . . . Dry Ice (Carbon Dioxide Ice) . . . Analytical Sodium Chlorite
M.A.W.X. 559
Mathieson Chemicals

MAGIC .....

.... in the Paper Industry

HAVE you ordered your wood-pulp Easter hat, your up-to-the-minute Derby to wear with your frock coat and striped trousers made of wood cellulose? And that stylish scarf and those Easter socks made of intriguing rayon? Of course, your wife's best Easter frock and her lingerie, as well as your own intimate undies, are made of super-rayon, or possibly celanese. That is, of course, if there is enough to go around to clothe all the people who wish to be as richly robed as the lilies of the field which surpassed Solomon in all his glory. For the raiment of the lilies of the field is wood cellulose spun by Mother Nature.

Wood cellulose! The miracle material! The basic factor of the paper industry has now become the basic factor of so many other industries that it requires a comptometer to tally them up, and as for the commodities into which wood cellulose enters as a constituent element, they are innumerable as the stars.

A paper-minded gentleman in a certain European city tells of calling upon a wood-pulp scientist recently who was dressed in a suit of clothes made entirely from wood cellulose without any admixture of any other material, "better in every way than similar fabrics made from wool or cotton," wearing a shirt, tie, socks and handkerchief all made from wood pulp. He opened a wood-pulp sack, covered with wood-pulp Cellophane, and with a spoon made of wood pulp handed the visitor some wood-pulp sugar to taste.

And, it was possible for this same wood-pulp dressed scientist to take his visitor into a room, seat him on a couch, the cushion of which was stuffed with "cellulose horse hair," the coverings of which were made from marvelous cellulose fabrics, the carpet on the floor of cellulose felts, the door handles and the water pipes of a plastic product whose basis was cellulose, the curtains at the windows and the panellings of the walls all made from wood-pulp cellulose. Literally, the room was built, equipped, decorated and furnished from wood-pulp cellulose and its derivatives. To cap the climax, on a Micarta-topped table rested a fancy confectioner's box containing chocolates in various shapes and sizes. The box, its lovely lining and transparent covering, and the chocolates themselves were all made from wood pulp!

What an amazing world of paradoxes science and research have opened before the astounded eyes of the orthodox paper fraternity.

It is coming to pass that the world sees at last that its most precious resources and reservoirs of wealth are the trees of the forest. They must be conserved in order that civilization may be preserved.

The day of the saw mill waste is done. The pulp-mill digesters are the economic mediums through which wood will be serviced to humanity in the future.

+ EDITORIAL +

Translating Trends

PROBABLY there is no better barometer of conditions in an industry than the activities of trade organizations or associations affiliated with it.

The truism of such a statement, as it applies to the pulp and paper industry, was amply demonstrated by the recent meetings in New York City of the American Paper and Pulp Association, the Technical Association of the Pulp and Paper Industry, and other affiliated bodies. The week of February 21 was Paper Week in New York, as it brought together in that city, as has been the custom for a number of years past, many of the leading executives, technologists, chemists and engineers of the industry. This representation not only included many of the mills of the United States, but of Canada and other countries as well. It was a grand get-together of individuals with a common interest in a common cause—the prosperity and progressive development of the pulp and paper making industry.

There were the old timers who have attended the annual meetings for years. Some of the old familiar faces were missing. There were faces which were seen for the first time.

It was the alchemist of time at work. The new was being mixed with the old. From such a test tube can come only development and progress.

There were the formal programs—well-planned, well-executed. Then, too, there were the informal personal contacts.

Subjects relating to technical progress within the industry were discussed. Advanced ideas in engineering thought were presented. The business situation was analyzed.

All in all, the meetings and personal contacts were a translation of trends which, when literally interpreted, point to more efficient processes of manufacture, more complete understanding and satisfactory handling of management problems, and to better financial prospects for the mill which chooses to lead rather than follow.

Planning Your Own Advancement

AT some period in his life, every man feels that he ought to go into some business of his own—work for himself and not be dependent on a salary or wages. This ambition, worthy as it may be, can never, in the majority of cases, be realized.

In the first place, economic stability demands that there be a certain number of directed workers; in the second place, a majority of workers are not fitted either by training or temperament for the successful operation of their own business establishments. The high mortality rate among business enterprises is indicative of the latter point.

How, then, may a man who has a definite training along certain lines achieve the greatest success, both mentally and financially?

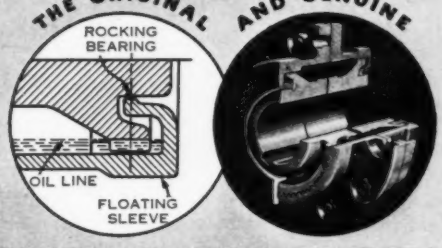
While advice on this general subject is plentiful, there is one angle of it which has not received as much comment as it deserves. The point is this: look upon your experience and training as a business. Take an occasional inventory of yourself just as the merchant does. Is your mental capital greater than it was a year ago?

If you were to capitalize your mental assets, at what figure could you conscientiously value them? If your mental capacity is worth $30,000, then allowing 10 per cent as a fair charge for interest, profit and depreciation, your annual salary ought to be $3,000 a year.

Many engineers whose valuation may be far in excess of that figure have incomes less than the $3,000 figure. The reason for this state of affairs is obvious; their sales department has not kept pace with production.

In operating a successful enterprise, the business man looks ahead and analyzes every move with a view to its effect on the profit and loss account. Engineers ought to apply the same method profitably to their own advancement.

THE SUPERIORITY SHOWS UP IN PERFORMANCE



The illustrations show Fast's construction. The load-carrying surfaces are protected from wear by a positive film of oil. This oil is kept permanently clean by the rocking bearings which make precise metal-to-metal contact and are in the one position where they form permanent dust and moisture proof seals. These vital features are found only in genuine Fast's Self-Aligning Couplings.

NO "TIME-OUT" FOR FAST'S

Holding the "line" in the thick of every play, day after day and year after year—that is the record of Fast's Self-Aligning Couplings in countless applications in all branches of industry. The stamina that makes such service possible is *designed*-in, through exclusive engineering principles—*built*-in in one of the most modern coupling plants in the world. Ten, and fifteen years with no attention but oiling, no maintenance cost, and no apparent wear, have been reported by users. *The superiority shows up in performance*, a superiority that spells continuous production and steady profits for Fast's users. Next time get Fast's, there is no equal. Koppers Company, BARTLETT HAYWARD DIVISION, BALTIMORE, MD.

FAST'S COUPLINGS

a KOPPERS product

CURRENT THOUGHT

Progress by Indirection

WILLIAM SIBLEY

IT IS more than passing strange to me why the simple truth of "help others and you help yourself" frequently escapes entire industries. It has been proved so many, many times by individual companies and with specifically branded products that it seems odd whole industries, through co-operation, do not similarly help themselves by this same indirection.

In one small mid-western town there is a medium sized company making a raw product used by manufacturers of appliances and fixtures. All told, this company probably hasn't more than 150 good prospects for its product in the entire country. Manifestly, a very restricted field, and one which would seem discouraging to men of initiative filled with eagerness to grow. More especially would it seem so when it is known that this company has two very serious competitors. A six-to-eight million dollar potential split three ways—and with such a limited number of prospects that progressiveness would seem limited to one's ability to swipe one's competitor's customers.

But this company thinks constructively, not destructively. It wants to build new business rather than merely trade customers. And so this company takes whole pages in expensive trade journals, reaching and covering particular vertical fields—not so much to advertise its particular brand of raw material as to boost its customer's sales of "de luxe" appliances. Its customers make a longer profit on their de luxe line of appliances, and it is only on those more expensive appliances or fixtures that this company's product is used. So, this raw material supplier spends its own good money to help sell customer's long-profit line, and thereby not only makes friends among its present customers but helps its friends sell the fixtures and appliances carrying its raw material. Simple enough when you see through it—but too few of us can see the material benefit of that long-pull, indirect sales approach.

Years ago I suggested in these pages that had the railroads possessed the vision of Henry Ford or R. E. Olds—back in the days when automobiles were both inefficient and expensive—they would have built long highways along their rights-of-way and sold transportation on those level, straight paved highways to automobile owners on a toll-basis. And thereby capitalized their present worst competitor. Sounds chimerical, but remember: that could have been done 'way back when there was yet time to educate the people to toll roads. It might have been done, had it been started quickly enough—done right, and carried through to completion.

And years ago I advocated, also in these pages, the co-operative advertising of paper by the paper industry as a whole. It should have been started then; it yet may be started to the pronounced benefit of our industry. And it might well be done by this same simple formula of "helping others." Take just two extraneous fields, for instance: Advertising and Air Conditioning.

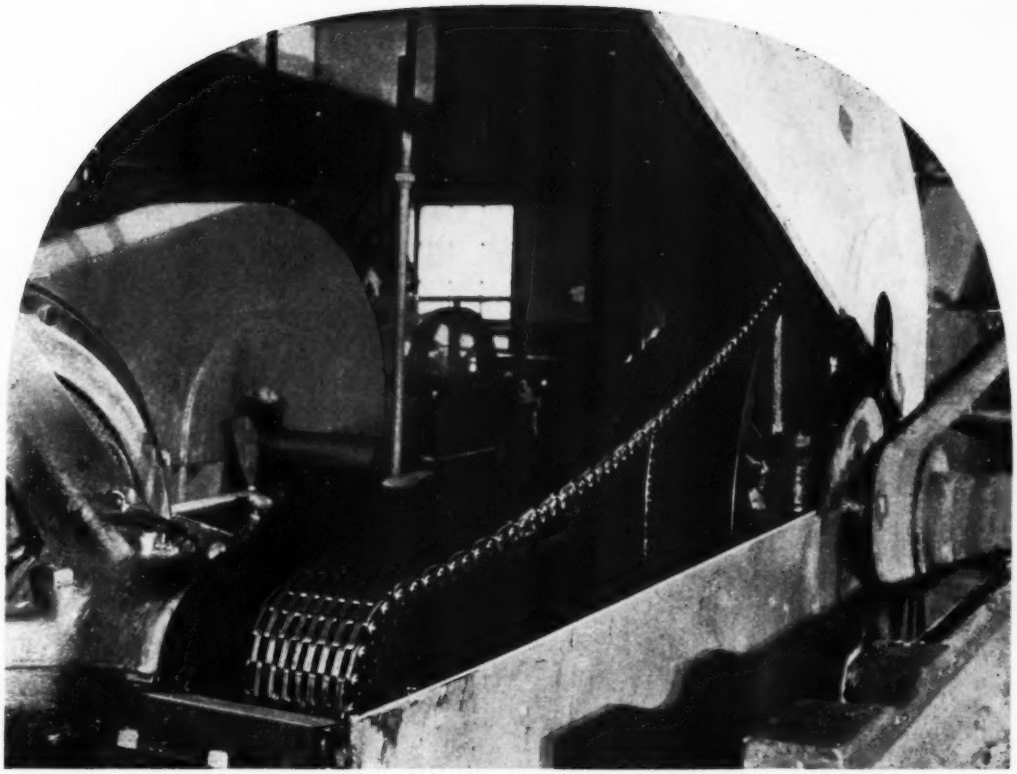
The advertising fraternity is responsible for the consumption of a vast amount of paper. If we, as the paper industry, would advertise advertising, we could increase, vastly, the consumption of our paper. In the average newspaper the advertising columns will occupy as much space as the editorial content. Yet it is a fact that in 1937 newspaper advertising was nearly 30 per cent less than it was in 1929, and only slightly ahead of what it was in 1921. And this despite the fact that 1937 circulation figures reached their all-time high, being 6 per cent ahead of 1929 and well over 40 per cent ahead of 1921. These contradictory percentages just don't make sense, but they are facts.

Here also are some more facts: Only five out of 5,700 cigar manufacturers are users of newspaper advertising, and only about 70 out of nearly 4500 insurance companies ever spend a dime in newspaper advertising. There are some 5200 "regional" or "national" advertisers, yet less than three hundred of them spent more than $100,000 a year in advertising. There are literally thousands of firms doing anywhere from $500,000 to $3,000,000 worth of business a year who don't advertise at all, except perhaps for a cheaply produced "house-organ."

Suppose the paper industry should actively help the newspapers sell space? The answer is obvious.

Air conditioning is one of the coming industries of the country. It will doubtless some day be as huge as the automotive industry. Air conditioning requires insulation—and paper, or pulp, can form the basis for a very splendid insulation board. More especially is our product needed by the millions of homes which were built before air conditioning was ever thought of. New construction might conceivably be started right from the beginning—but what are the air-conditioning people going to do with the twenty million homes which want that comforting necessity but which are too leaky of air to permit of its successful operation. Along this line I merely leave this thought with you: the outside walls alone of twenty million homes—or two million homes—or even five hundred thousand homes—would require a lot of insulation. Enough to keep a couple of pulp mills running for at least a few weeks!

Is there anyone in the paper industry with the vision to take this bare suggestion and work it out? Can that visionary command the interest of a few of the industry's leaders so that his presentation will be given earnest and serious attention and connsideration? I can't do it. But, gentlemen, we can lift ourselves into triple production and quadruple profits if we will invest in the simple adage "help others and we help ourselves."



YEARS OF UNFAILING SERVICE

● Working smoothly and quietly in their oil-retaining casings, many Link-Belt silent chain drives have been on the job continuously for one, two, even three decades.

Think what this means in terms of cost. Starting with a low first cost (frequently lower than belts), each additional year that a Link-Belt silent chain drive is in service brings down the overall cost until it is negligible. Usually, after it is written off the books—it still goes on delivering every R.P.M. of the motor (no-slip) in a smooth, steady "flow."

That's efficiency—qualities which assure steady top production with little time out for maintenance and repairs. The nearest Link-Belt Positive Drive Specialist can show you how this drive can be profitably applied in your plant.

Drives carried in stock—½ to 60 H.P.—by distributors throughout the country. Larger horse powers supplied from the factory on short notice. Send for engineering data book No. 125.

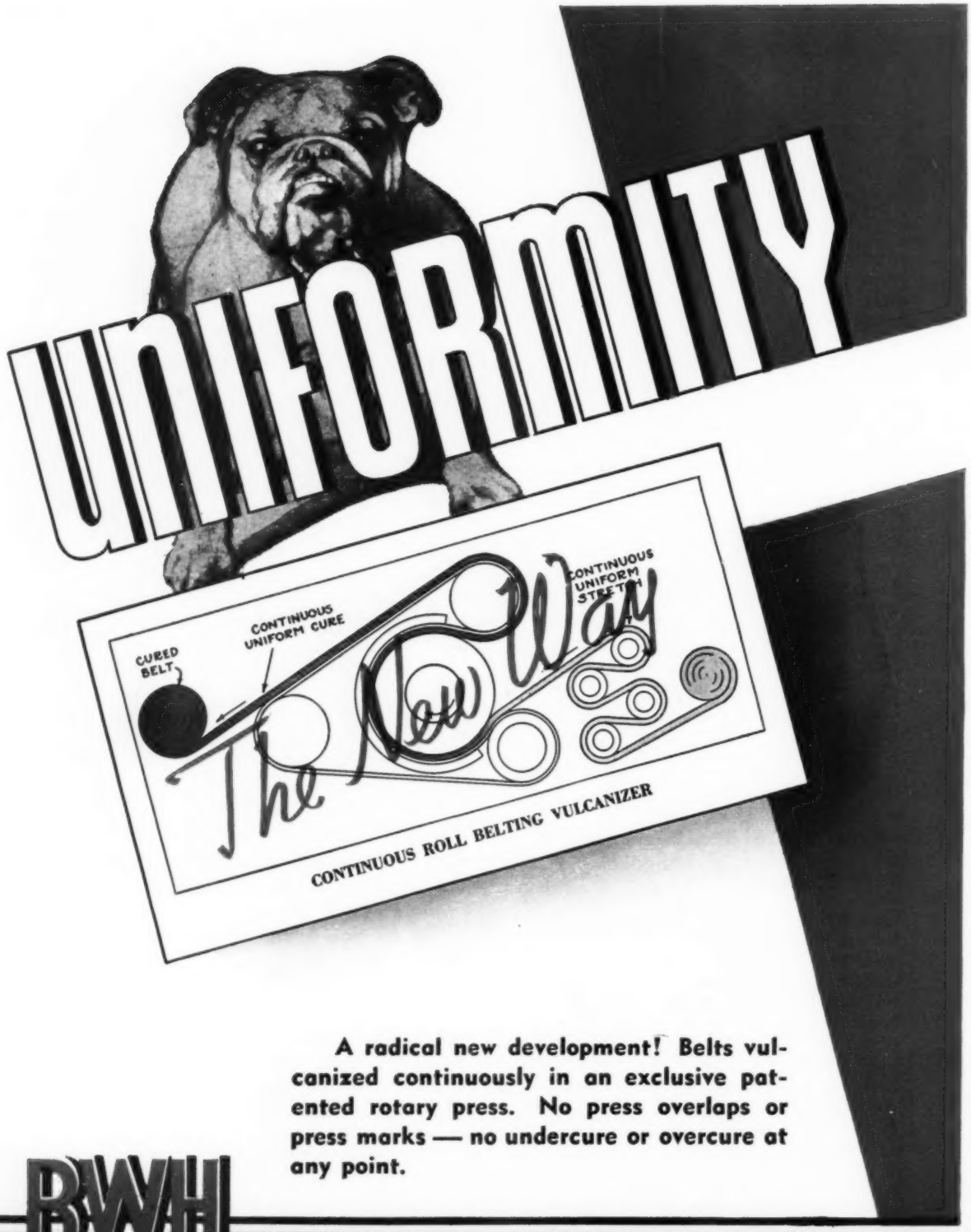
Link-Belt Company, Indianapolis, Chicago, Philadelphia, Atlanta, San Francisco, Toronto, or any of our offices located in principal cities.

O T H E R L I N K - B E L T P O S I T I V E D R I V E S

Silverlink Roller Chain Drives	P. I. V. Gear Variable Speed Transmissions	Herringbone Gear Speed Reducers	Worm Gear Speed Reducers	Motorized Helical Gear Reducers

726ec

LINK-BELT *Silverstreak* SILENT CHAIN DRIVES



A radical new development! Belts vulcanized continuously in an exclusive patented rotary press. No press overlaps or press marks — no undercure or overcure at any point.

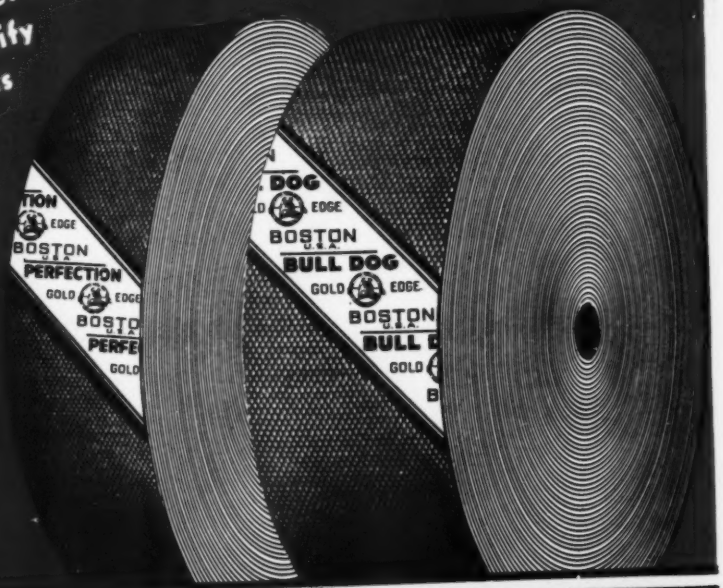
BWH

BOSTON WOVEN HOSE

THE ROTOCURE PROCESS OF CONTINUOUS VULCANIZATION

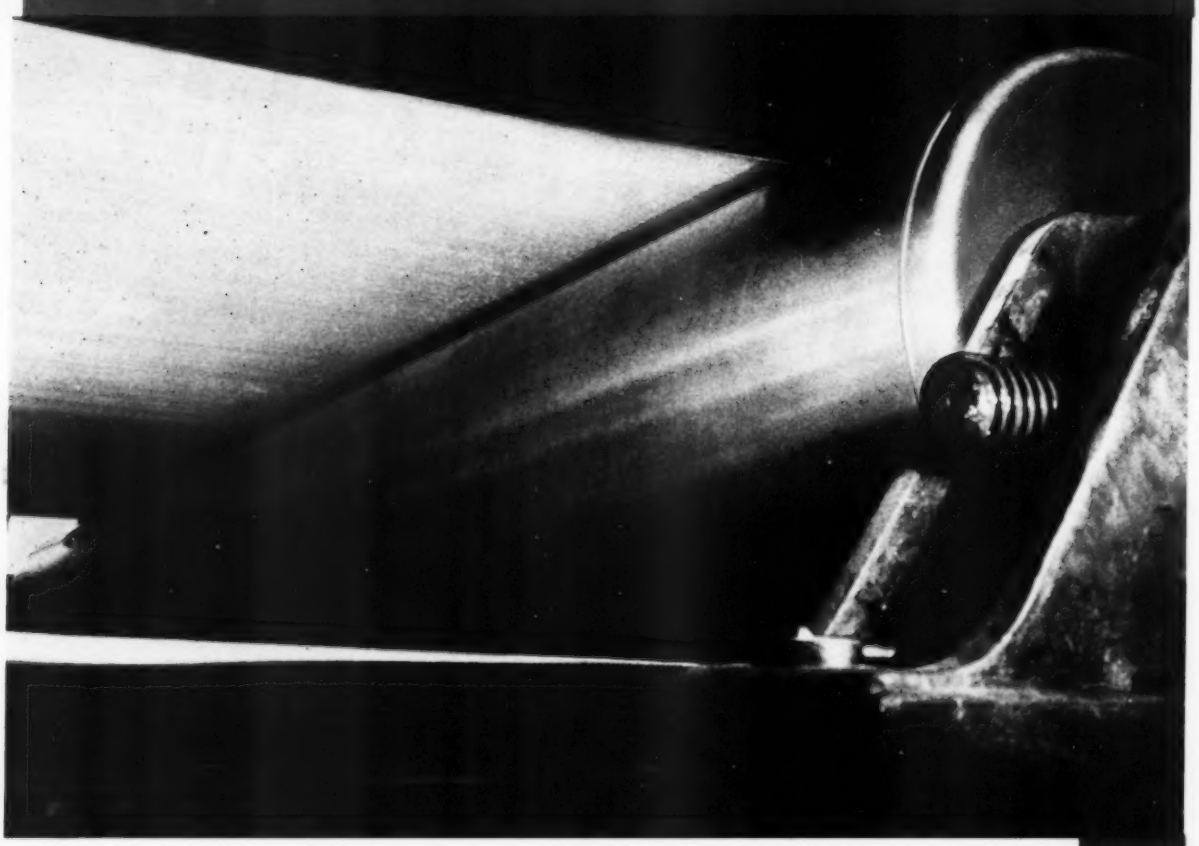
FOR BWH RUBBER . . . TRANSMISSION BELTS

Boston Woven Hose is continually perfecting new and bettzr methods for producing mechanical rubber goods. Bull Dog and Perfection Transmission Belts, vulcanized continuously, offer new values and extra service in transmission belting. Yet they cost no more than other first quality belts. Specify Bull Dog for heavy loads and severe service,— Perfection for high speeds and small pulleys.



AND RUBBER COMPANY BOSTON MASS.

LOOK at the WEAR SIDE!



WIRE LIFE • WEAR RESISTANCE •••

are built-in qualities assured to you by EASTWOOD principles of wire construction. ● RESEARCH *plus* practical development over the years *standardize* EASTWOOD WIRE productions for low-cost operation, extreme service rendition and superior finish.

Look at the WEARSIDE OF YOUR WIRES!

●*Superiority*
●*Economy*
demands
EASTWOOD!

EASTWOOD-NEALLEY CORP.
BELLEVILLE · NEW JERSEY

Dilts

- **BANDLESS BEATER ROLLS:**

  Dilts built and designed for hard wear. Will take any "stuff" you care to work—from raw roofing rags to high grade bonds and ledgers.

- **EFFICIENT AND SAFE:**

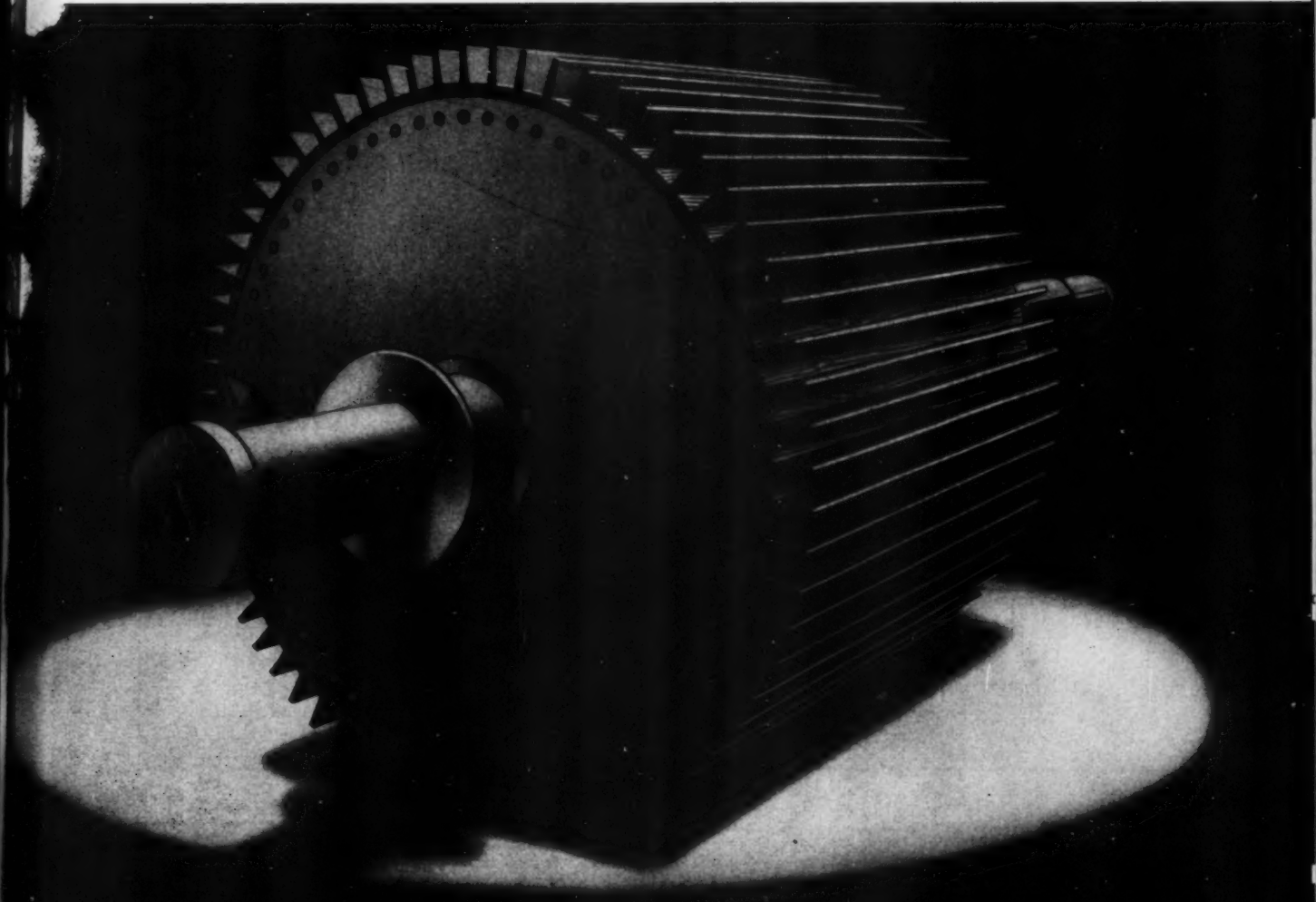
  Continued and safe operation is insured by tapered bars and double tapered locking keys—in addition to the three piece wood filling. Any fly bar can be removed without disturbing others or removing roll from tub. No skilled labor required.

- **YOUR PRESENT BEATERS:**

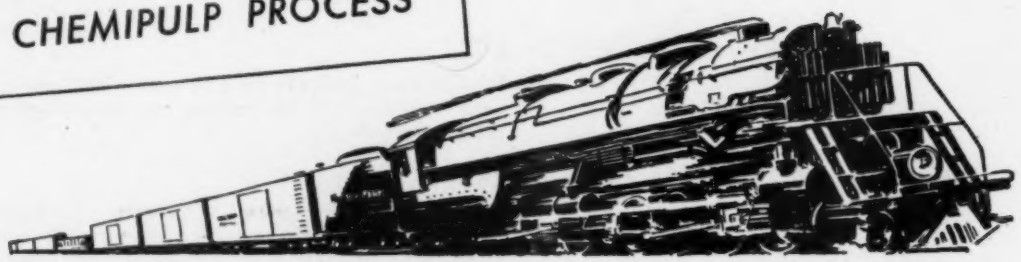
  May be modernized by rebuilding. Using your old spindle, we can build this Bandless Beater Roll for your safety and plant economy.

Our able engineering staff will gladly consult with you on your individual requirements without obligation to you. Write for details.

DILTS MACHINE WORKS INC., Fulton, N. Y.



TWO MILLION TONS OF SULPHITE PULP ARE NOW PRODUCED ANNUALLY BY THE CHEMIPULP PROCESS



REPRESENTING THE FOLLOWING ANNUAL SAVINGS TO THE SULPHITE PULP MILLS ON THE NORTH AMERICAN CONTINENT - -

1. *150,000 tons of COAL - - equivalent to 3000 carloads of 100 tons each, or 30 solid trains of 100 cars each.*

2. *40,000 tons of SULPHUR - - equivalent to 1000 carloads, or 10 solid trains of 100 cars each.*

3. *40,000 tons of LIMESTONE - - which is also equivalent to 1000 carloads, or 10 solid trains of 100 cars each.*

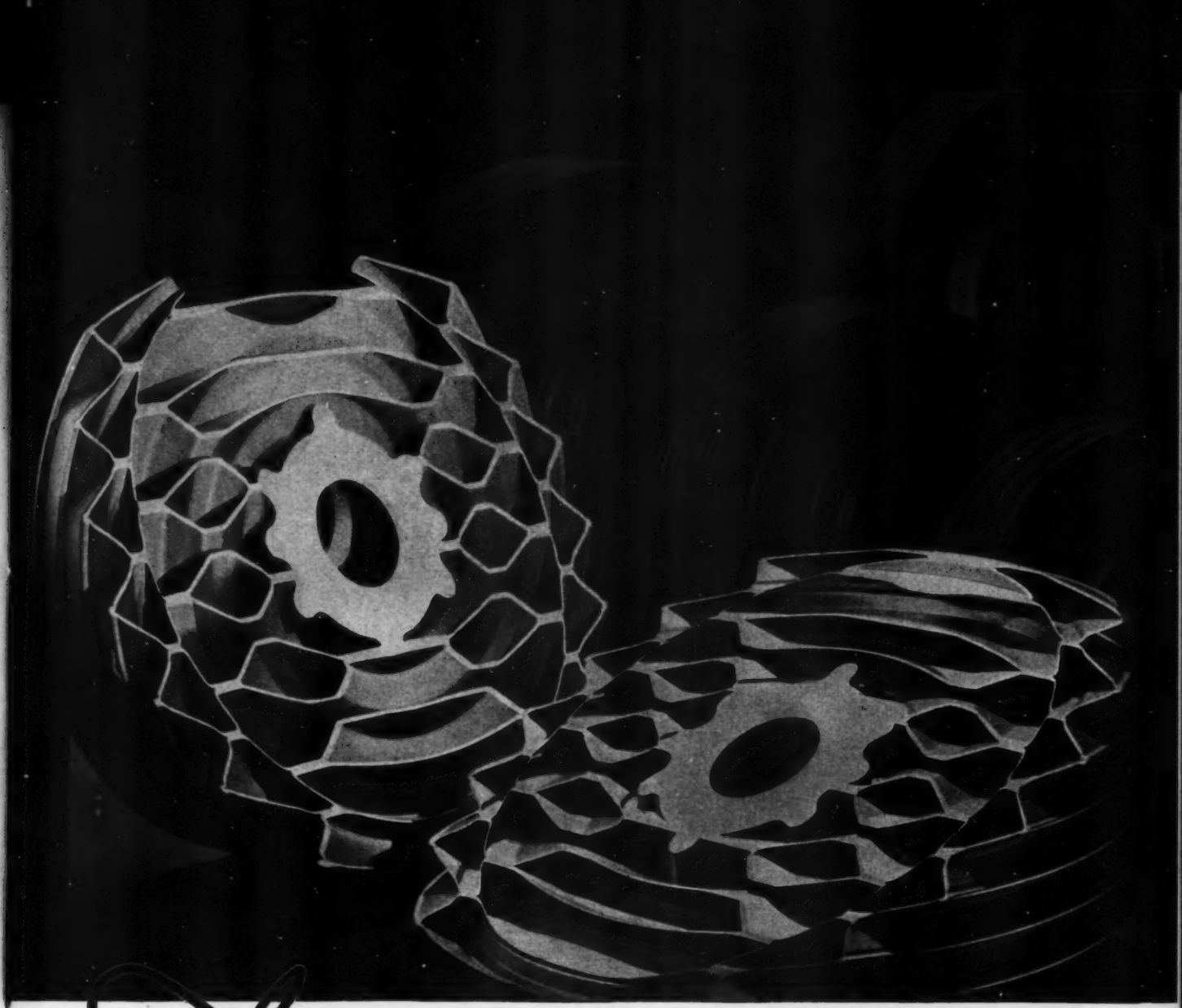
4. *WOOD saving is variable due to the quality of the wood used and the length of the cooking time, but normally this represents an average saving in wood of approximately 206,000 cords, which is equivalent to over 9000 carloads, or 90 solid trains of 100 cars each.*

5. *In addition to the above, mills that are bleaching their pulp are making substantial savings in CHLORINE.*

CHEMIPULP PROCESS INC.

500 Woolworth Bldg., Watertown, N. Y.
Pacific Coast Office:
3311 First Ave. So., Seattle, Wash.

Canadian Office:
CHEMIPULP PROCESS LIMITED
403 Crescent Bldg., Montreal, Que.



The inside story . . .

THIS illustration tells the inside story of Duro-Brace Texsteel Sheaves.

Lightness (in order to reduce bearing pressures to a minimum) is highly desirable in a sheave, but none of its strength may be sacrificed to this end.

Allis-Chalmers engineers set about this seemingly contradictory problem and solved it by designing an interior grid-type of construction, which gives the strength and rigidity of cast iron with the lightness of pressed steel, and a smartness in appearance that adds distinction to any machines equipped with them.

In this design the outside walls of the sheave are also reinforced by convex steel plates, which so greatly increase their strength as to eliminate distortion even under the severest duty. The result is a light, true-running, vibrationless drive always.

Duro-Brace Texrope Drives are silent, 98.9% efficient, slipless, shock-absorbing, require no belt dressing or lubrication, and are not affected by dirt or moisture.

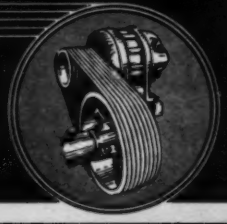
Write us for Bulletin No. 2188, which sets forth the advantages that Duro-Brace Texsteel Drives offer you in all matters of power transmission.

Belts by Goodrich

840

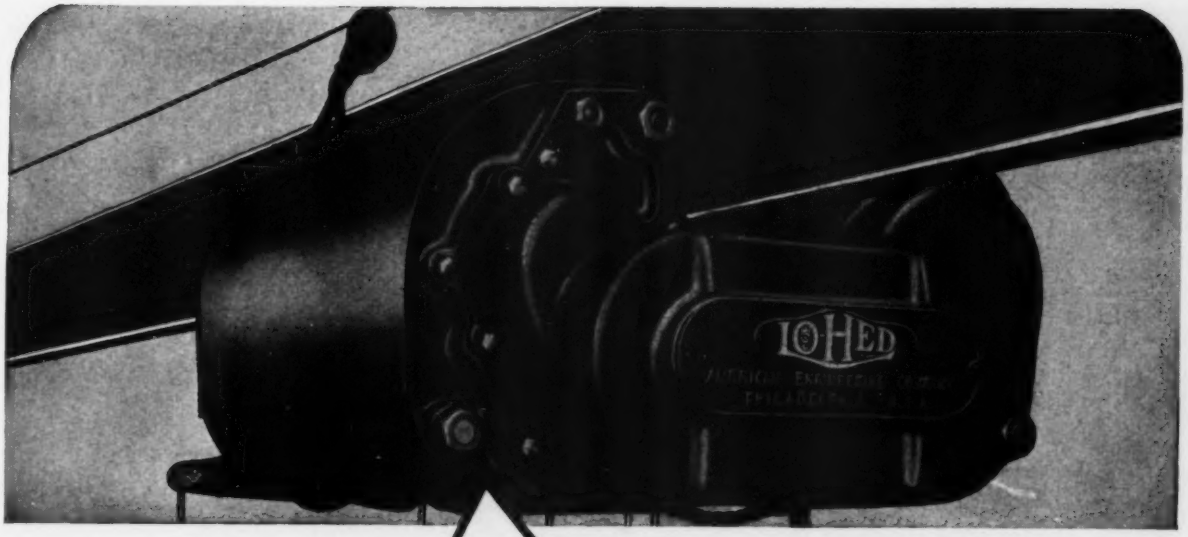
TEXROPE DIVISION

ALLIS·CHALMERS



MILWAUKEE WISCONSIN

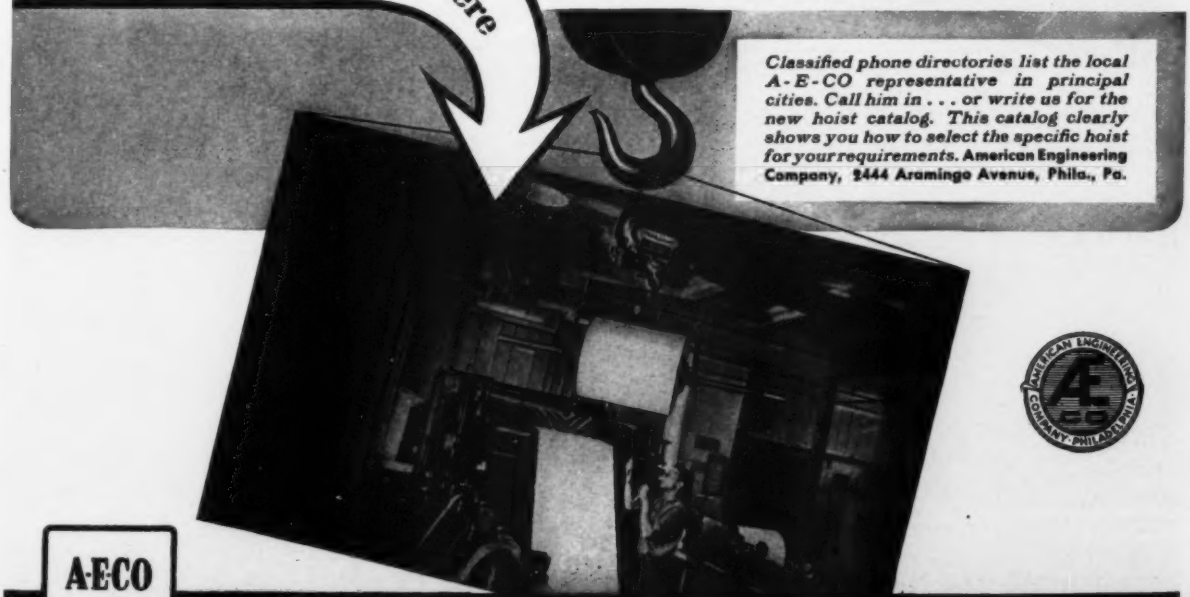
Appleton
FELTS
Make good
PAPER . . .
THE MARK OF QUALITY
APPLETON WOOLEN MILLS . APPLETON, WIS.



A High Factor of Safety Here

Assures Safer Handling Here

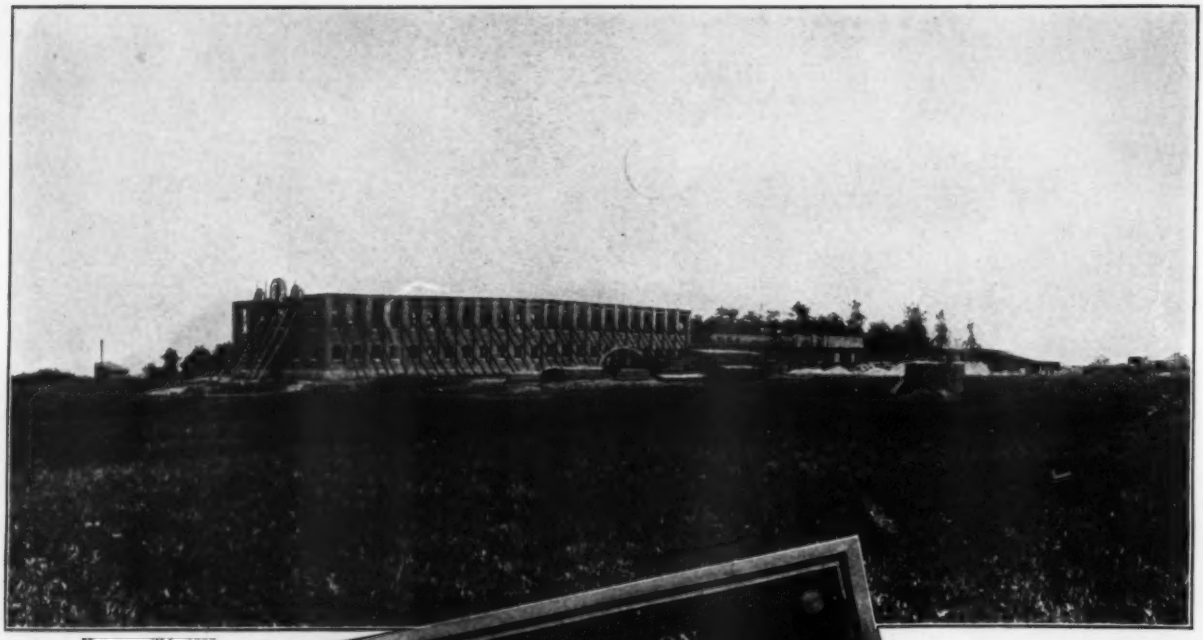
Specify *THE* hoist with the highest factor of safety! • Let the nearest A-E-CO representative show you why A-E-CO Lo-Hed HOISTS are the safest hoists built. • Ask him to explain Lo-Hed's exclusive features that mean constant, dependable performance and lower maintenance cost. • Let him show you Lo-Hed's uses in scores of industries. • Find out *why* Lo-Hed is the logical hoist for EVERY purpose and why it is the *only* hoist for low headroom conditions. A-E-CO Lo-Hed HOISTS are built in 98 standard models—from ¼ to 12 ton capacities.



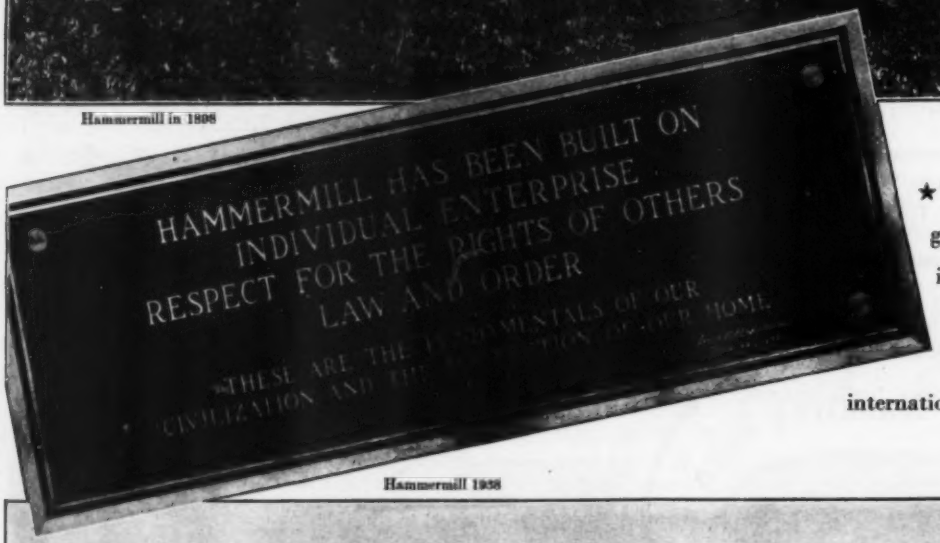
Classified phone directories list the local A-E-CO representative in principal cities. Call him in . . . or write us for the new hoist catalog. This catalog clearly shows you how to select the specific hoist for your requirements. **American Engineering Company, 2444 Aramingo Avenue, Phila., Pa.**

A-E-CO Lo-Hed HOIST

AMERICAN ENGINEERING COMPANY

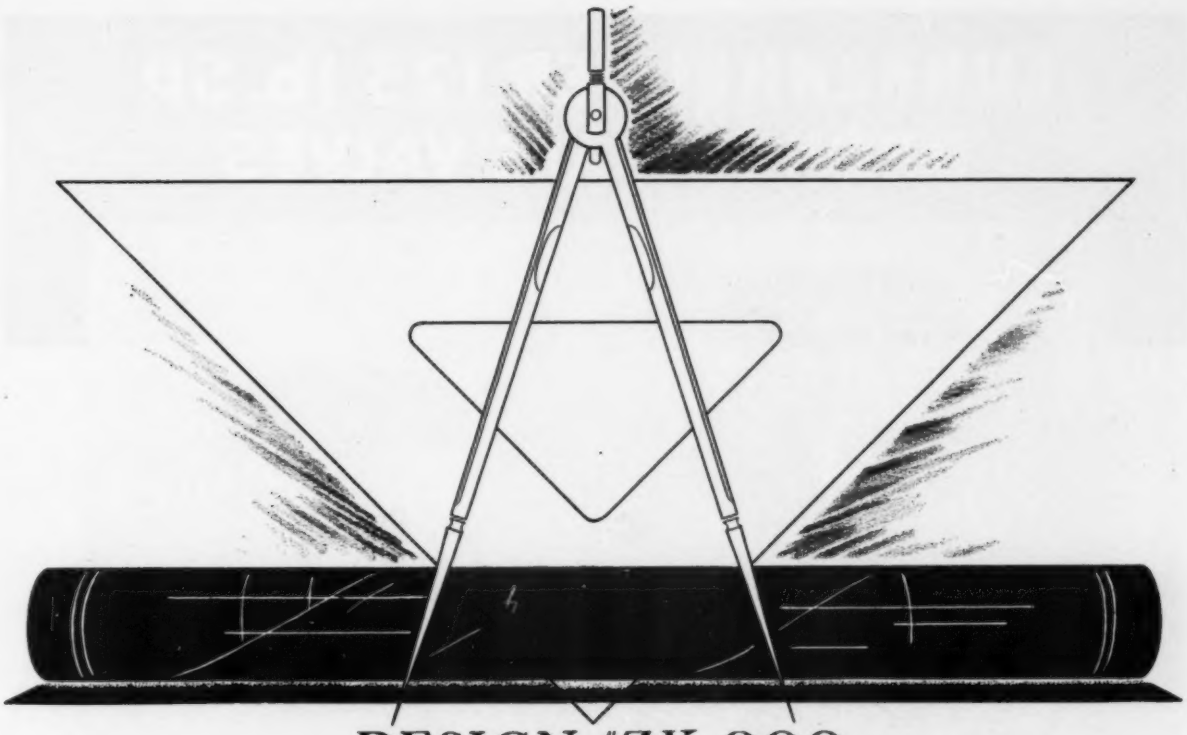


Hammermill in 1898



Hammermill 1938

★ The principles that have guided Hammermill from its beginning forty years ago in a wheat field to its position today as an internationally known paper mill



DESIGN #ZK-OOO

By S & W — *for Progressive Mills*

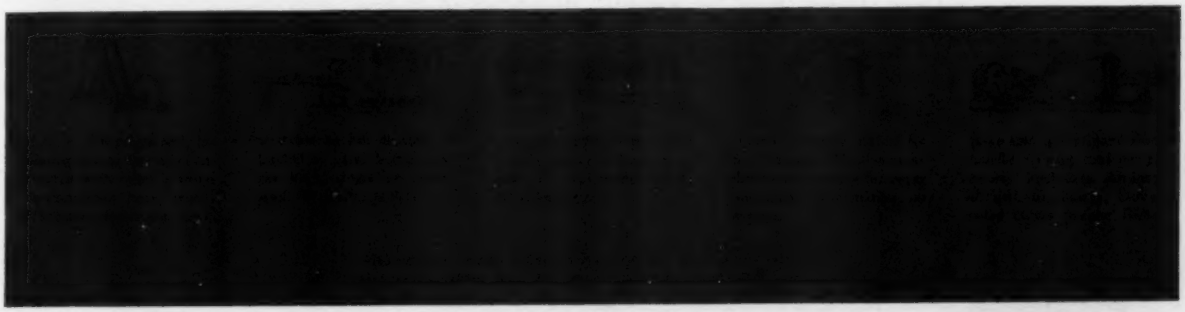
When S & W engineers fashioned the Undercut ream cutter, they were shooting at two marks — safety, with more than ordinary efficiency.

Safety comes from the design. Gravity, itself, is a positive safety feature. And dual controls keep the operator's hands below the table. Accidental starts are impossible: There's less spoilage.

The always-aligned knife (which can be installed by one man) delivers a *straight* upward cut. No slipping, perfect lay, and easier pad work come from this vibrationless cut stroke. There is an equalized hold of clamp.

Some mills have purchased as many as 30 Undercuts for work on the finest grades of paper. Equal success is obtained on bindersboard, cardboard, etc.

Will your mill modernize? We'll gladly send you a bulletin on Undercuts. Just have your secretary write for it.



The SMITH & WINCHESTER

Manufacturing *Company*

ONE HUNDRED AND TEN YEARS OF ADVANCEMENT

PLANT AND OFFICES AT SOUTH WINDHAM, CONN.

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Rising Stem

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These two valves offer many advantages to users of 125 lb. SP bronze gate valves.

Their design provides unusual strength and ruggedness—accurate machining is to close tolerances—materials exceed accepted standards. In short they possess the inherent quality, characteristic of all Lunkenheimer Valves, which means they will stay tight and will give added values in long service life and low cost upkeep.

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LUBRICATING DEVICES

WHITE PAPER

in spite of spring's high waters

SPRING is an anxious season for the sales manager of a paper mill. High water and unusual manufacturing conditions may result in discolored stock. It is his problem to give his customers normal service and quality paper in spite of these extreme conditions. Business will suffer unless he can deliver what the customers order.

Profits are threatened when seasonal changes are allowed to affect the quality of a product. But the profits of the mill that uses Krebs pigments are insured—for they make it possible to turn out a uniform grade of paper the year round.

Krebs Pigments can't turn the floods, but they do make papers *whiter, brighter,* and *more opaque*—under any circumstances. You can be sure that they are always uniform and the finest that can be had.

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Nash Compressors, like Nash Vacuum Pumps, are reliable.

Miscellaneous compressed air requirements in the paper mill can best be handled with a Nash Air Compressor. The Nash Air Compressor has one moving part, a rotor cast in one piece, revolving without metallic contact, and requiring no internal lubrication.

These pumps are designed to operate at speeds suitable for direct connection to electric motors, are compact, and may be installed wherever convenient. Pressures up to 75 lbs. are available. Bulletins giving full information will be sent on request.

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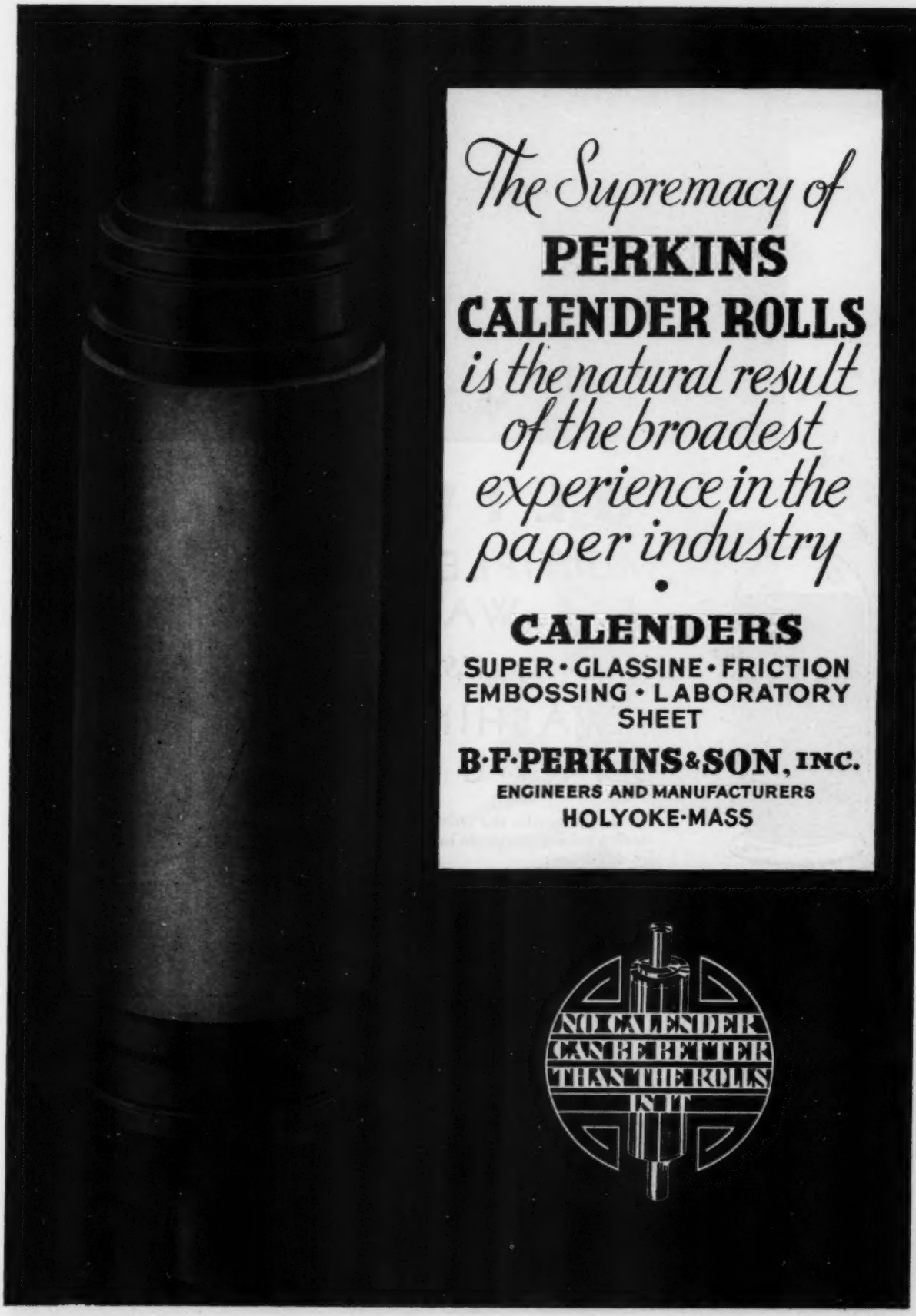
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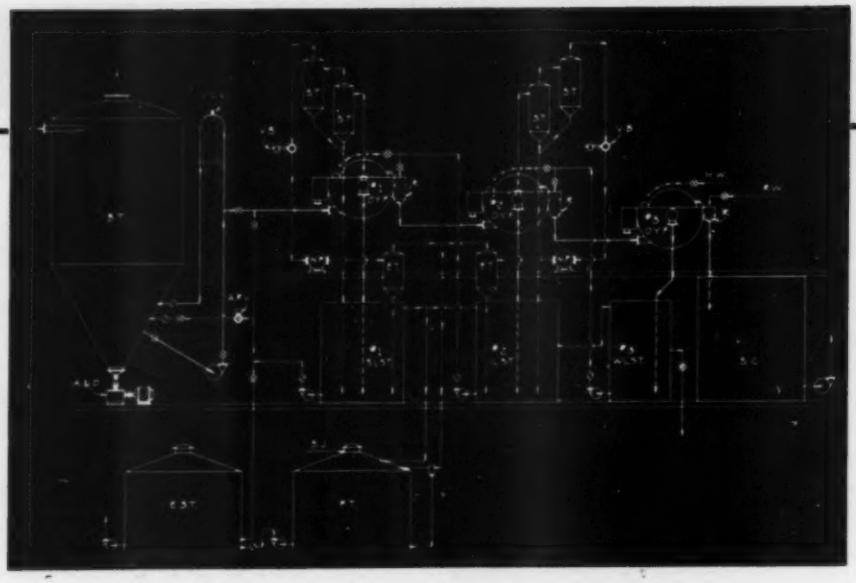

OLIVER

MULTIPLE STAGE B. S. WASHING

vs

WASHING BY DIFFUSION

OLIVER

Higher Black Liquor Concentration
13°-14° Bé at 60°F.
Lower Total Salt Cake Loss
25 to 75 pounds

DIFFUSERS

Lower Black Liquor Concentration
10°-11° Bé at 60°F.
Higher Total Salt Cake Loss
95 to 125 pounds

On three counts, the Oliver System of brownstock washing proves to be superior to washing by diffusion:

1. **Black liquor concentration is high, thus reducing evaporation charges.**
2. **Total salt cake loss is less, thus saving in cost of chemicals.**
3. **Losses due to foaming are eliminated.**

These three combine to provide a fourth advantage . . . lowest per ton cost.

The Oliver System, now in operation in a number of kraft mills, is the modern way to wash brownstock.

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Powell steel valves have made a definite mark in the engineering world for greater efficiency in low and high pressure control equipment. Write for detailed information regarding your particular problem!
POWELL VALVES
THE WM. POWELL CO. CINCINNATI, OHIO

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INDIVIDUAL paper towels are just about the least expensive of necessities. On the basis of cost alone they have relegated the democratic "common towels" to the limbo of forgotten things. Paper towels are safe, sanitary, saving. They vindicate the economic and social significance of mass production as practiced by the leading paper mills of America. » » Speed is essential to low cost in the paper industry. Because they remove excess water most uniformly from the web and stand up longest under the terrific strains of the highest speed paper machines Hamilton Felts have become standard equipment with the leading mills that specialize in the manufacture of paper towels and toilet tissues.

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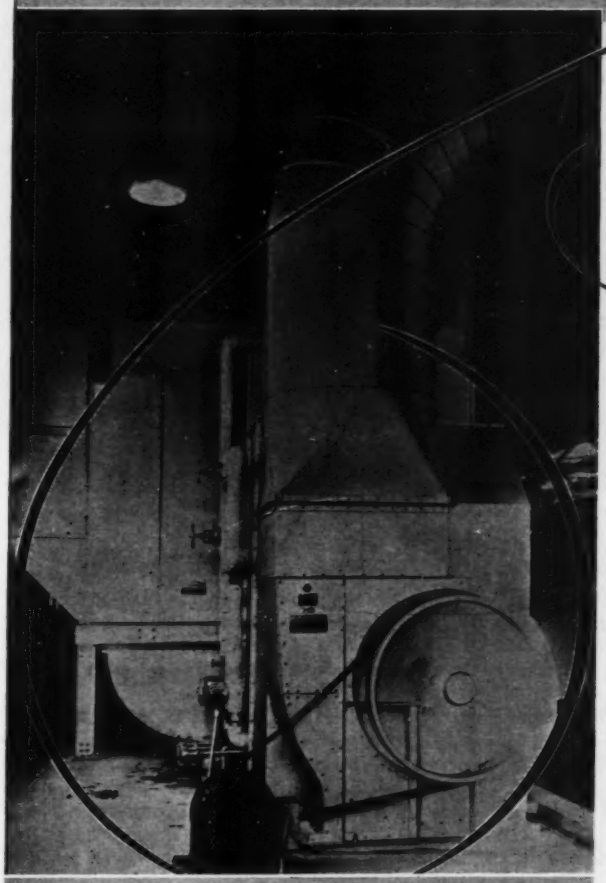
• Miami Woolen Mills, Established 1858 •

Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

Hamilton Felts

"and it sure cut our steam cost per pound of paper dried this Winter . . ."



View of Ross-Briner Economizer apparatus conveniently located on a machine room balcony with connections to machine hood and roof supply.

ROSS-BRINER Economizer

Mounted on balconies or roofs of scores of mills, Ross-Briner Economizers continue to effect almost unbelievable savings in steam costs. Every installation has succeeded in quickly paying for itself with the saving secured from full utilization of vapor heat that would otherwise be wasted. If you are without a Briner-Economizer or have neglected to keep yours in repair, we can promise you startling reductions in boiler loads and cost of steam per pound of paper dried.

Check up on your present steam costs! They may suggest a talk with one of our engineers.

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Seventeenth century Spaniards loading Barilla for shipment to France.

During the Middle Ages, alkalies were used extensively throughout Europe in the manufacture of soap and glass. One of the most important sources of soda was the ashes of a fleshy plant called Barilla, grown along the seashores of Mediterranean countries. Spanish Barilla was preferred by manufacturers until the close of the 18th Century when soda made from brine by the LeBlanc process began to supplant it.

Through The Centuries With Alkalies

Today, an impressive list of American manufacturers find their chief source of supply for Soda Ash, Caustic Soda, and other alkalies in the great Barberton plant of THE COLUMBIA ALKALI CORPORATION. This preference is not due to coincidence, but to the cold logic of careful purchasers who have found by long experience that COLUMBIA delivers quality and value.

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CAUSTIC SODA
SODIUM BICARBONATE
MODIFIED SODAS
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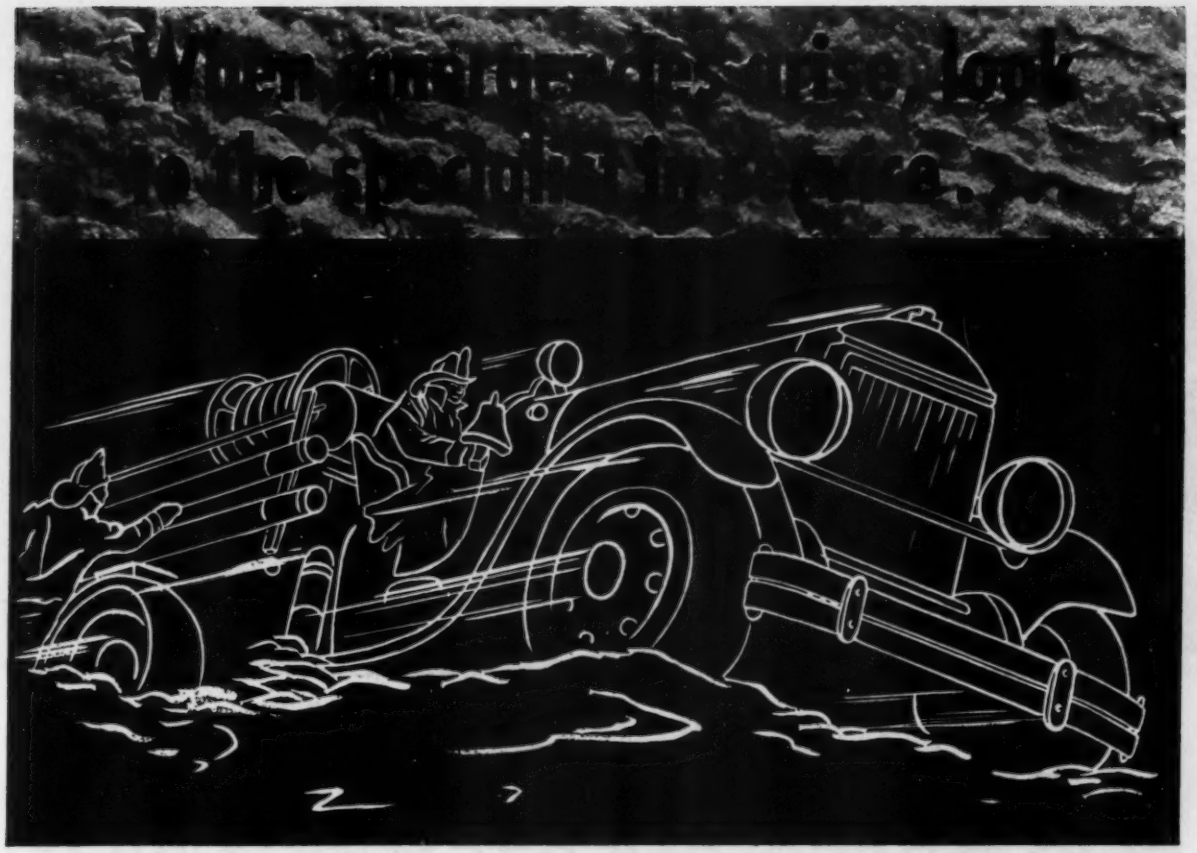
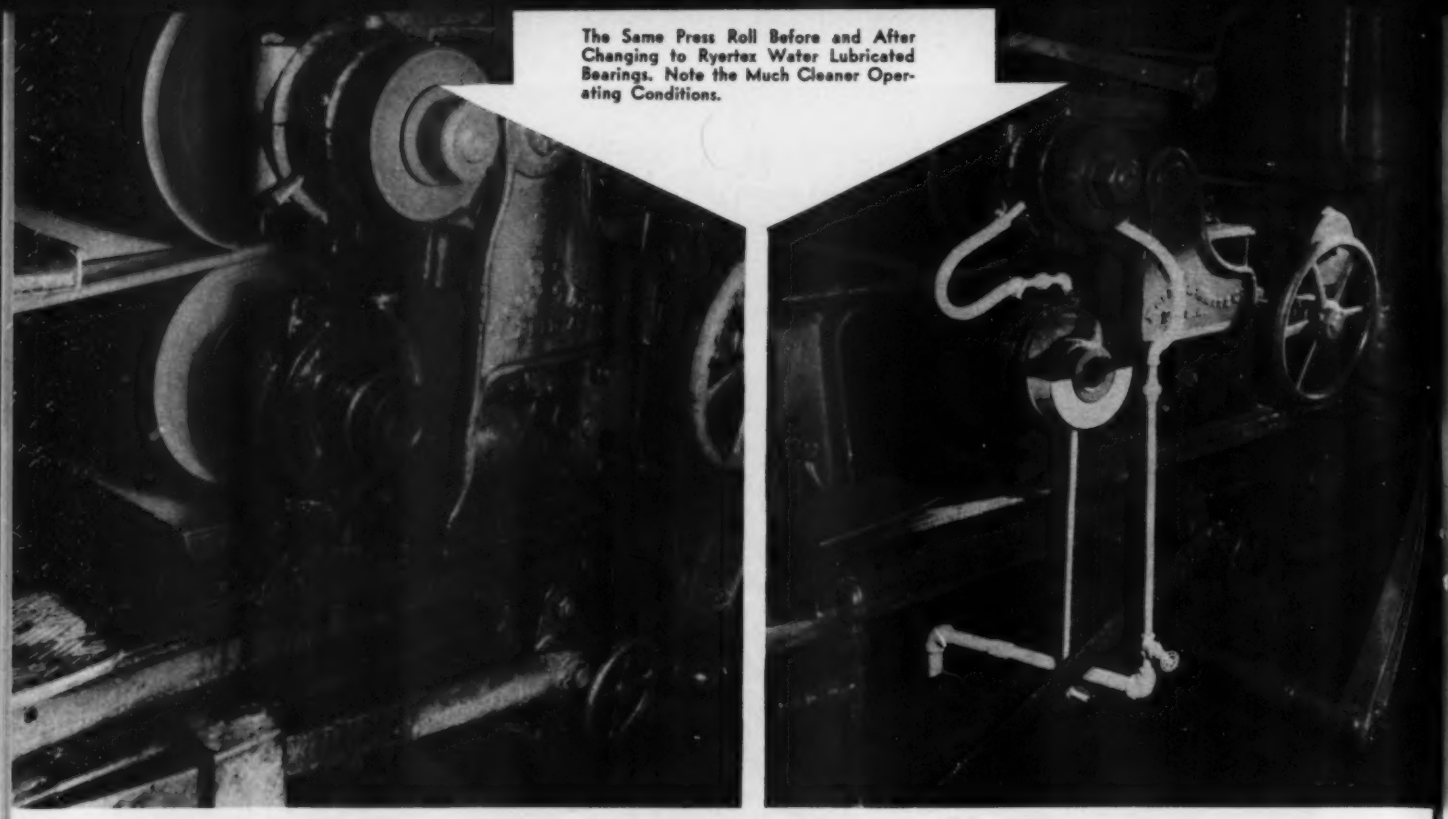


Just about the only thing that gives faster service than Black-Clawson and Shartle Brothers is a streamlined fire truck. That's because members of the B-C-S organization are trained to act . . . and act fast . . . when an emergency arises. ● Not only have they the desire and the facilities to render such "day-before-yesterday" service, but their central location puts them within a few hours' plane or train time from your mill. Black-Clawson and Shartle Brothers . . . specialists in emergency service.

BLACK-CLAWSON and SHARTLE BROS.



The Same Press Roll Before and After Changing to Ryertex Water Lubricated Bearings. Note the Much Cleaner Operating Conditions.

6 REASONS WHY OUR MILL* ENDORSES RYERTEX BEARINGS

1—Cleaner stocks

2—Large oil savings

3—Free running journals

4—Lower power consumption

5—No overheating of bearings

6—Longer bearing life

The advantages outlined above are characteristic of numerous and varied Ryertex Bearing installations throughout the Paper Mill Industry—installations that show highly efficient operation and definite financial savings.

The use of water as sole lubricant for Ryertex Bearings promotes clean felts and consequently cleaner stock. The advantages of this feature, together with the saving in oil are important enough to warrant their use.

In addition, Ryertex Bearings have a low co-efficient of friction (approx. 1/3 that of Babbitt) reducing power consumption. They have high compressive strength and the ability to withstand shock loads; also great resistance to acids.

Ryertex Bearings are moderate in initial cost and necessitate no radical change in housing when they are installed.

Paper Mill installations of Ryertex include: bleachers, jack-ladders, conveyors, grinders, digesters, log-hauls, slashers, drum barkers, screens, beaters, knotters, bark presses, chippers, chip crushers, deckers, paper machines and refiners.

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THE PAPER INDUSTRY
A MONTHLY EDUCATIONAL JOURNAL

Pulp For Rayon Manufacture

GUSTAVUS J. ESSELEN and
MARTIN H. GURLEY, JR.
Gustavus J. Esselen, Inc.

RAYON manufacture requires that its cellulose raw material meet rigid specifications. Its continued growth has created a new and important market for pulp, but one whose needs can be satisfied only by special care in pulp manufacture.

In the year 1936, it is estimated that the world rayon production reached 650,000 tons which required about 800,000 tons of cellulose. This was supplied largely as sulphite pulp made from coniferous wood supplemented by cotton and cotton linters, preferred in the acetate and cuprammonium processes. Hardwood sulphite pulp and southern pine supply minor quantities of cellulose for this market.

All cellulose used in rayon manufacture must meet the most rigid quality standards. These are unique in most respects and have little or no reference to standards established in the pulp industry for other purposes.

The methods of test for cellulose, here discussed in their relation to sulphite cellulose, apply equally to cellulose from cotton and from other sources. They are based upon the chemical and physical properties of the cellulose. The evaluating tests for determining these properties are: alpha cellulose content, hemi-cellulose content, moisture, ash, cuprammonium viscosity, ether soluble, color, copper number, cellulose number, 10 per cent potassium hydroxide soluble or soda soluble, dimensions and rupture strength of the pulp sheet (if used in sheet form) and several minor quantities, pH, fiber length, lignin and pentosans.

Alpha cellulose, from which rayon is made, may be defined as that portion of the cellulosic material which remains undissolved when a pulp sample is subjected to 18 per cent sodium hydroxide for one hour at 20 deg. C. under definitely controlled conditions. For the viscose process, it is desirable that the alpha cellulose content of the pulp be above 85 per cent, on a moisture-free basis. Sulphite pulps are commercially available, which have alpha cellulose contents as high as 93-95 per cent. Purified cotton linters average 96-99 per cent alpha cellulose.

The alpha cellulose left after a single treatment with 18 per cent sodium hydroxide has been found to contain some material which is soluble on a second treatment with the 18 per cent caustic. For this reason, one pulp manufacturer has proposed a method of determining "alkali-resistant cellulose." This consists of five consecutive treatments with 18 per cent NaOH, each followed by thorough washing and drying. The highest amount of alpha cellulose at which the loss with each succeeding treatment becomes constant is reported as the "resistant cellulose." This figure generally approximates quite closely the cellulose recovered in the viscose process. The alpha cellulose figure determined in the usual way is generally 3 to 5 per cent higher than the cellulose recovered as rayon in the viscose process.

The loss of alpha cellulose in the viscose process is caused in part by the separation of fibers in the initial steeping process and in part by removal of undissolved fibers in the filtration of the viscose. In addition, a portion of the alpha cellulose is so degraded during the conversion to viscose, that it is not regenerated in the spinning process, but appears as reducing material in the acid bath.

The hemi-cellulose content of a sulphite pulp is that cellulosic material which is soluble in 18 per cent caustic soda. It should never exceed 12 per cent of the pulp. Most pulps are well under this figure, averaging about 8 per cent hemi-cellulose. The hemi-cellulose in cotton is never more than 1.5 to 2.0 per cent and generally does not exceed 1 per cent. In the viscose process, this hemi-cellulose is removed in the steeping process and accumulates in the steeping liquor. Eventually this accumulation has to be removed, generally by dialysis of the caustic liquor. Because of the cost of this operation, many viscose rayon manufacturers prefer to use sulphite pulps having a high content (up to 95 per cent) of alpha cellulose and cotton linters. These higher alpha pulps have correspondingly less hemi-cellulose and the saving in cost of recovery of caustic offsets the higher price of the more highly purified pulps.

The moisture content of the pulp is determined by drying a weighed sample under standardized conditions and determining the loss in weight. Pulp as received at the rayon plant usually has 4 to 5 per cent moisture. The rayon manufacturer brings this to a uniform value of about 5 per cent, by storing the pulp under controlled atmospheric conditions. Analytical values are normally reported on a bone-dry basis.

The ash content of the pulp is determined by ignition of a two- to five-gram sample of the pulp. Recently rayon workers have paid more attention to the ash composition, being particularly concerned with the metals, iron, manganese and copper. In addition to the metals, sulphates and chlorides present in the ash are determined.

While the ash content should not exceed 0.12 per cent, pulps are now being produced with an ash content of less than 0.08 per cent of the whole weight of the product. The iron content should not be more than 0.001 per cent as Fe_2O_3, and the other impurities (manganese, silica, sulphate and others) should be present in amounts not exceeding those to be found in the caustic soda used or in the water supply.

While the metals generally reported in the ash are to be found in traces at least in most water supplies, the rayon manufacturer has no desire to increase these amounts by accepting pulps of high ash content. The polyvalent metals, in particular, reduce the viscosity of the viscose, and this property must be maintained with a minimum of variation.

If the cellulose, moisture and ash content of the pulp are satisfactory, the next important question is "what is its viscosity?" The viscosity of cellulosic materials is determined by dissolving a fixed weight of the material in a predetermined volume of cuprammonium solution. When the solution of the cellulose is completed, the viscosity of the viscous mass is measured in centipoises. A number of viscosimeters are available for this purpose, the Ostwald type being frequently used at the present time.

Various rayon manufacturers maintain different standard viscosities and have prescribed the limits within which they will accept pulp viscosities. The pulp manufacturers, by control of the pulp cooking, have effective control of the pulp viscosity and can offer the rayon manufacturer a range of viscosities to suit his needs.

The ether-soluble portion of sulphite pulps runs from 0.05 to 0.1 per cent. This material consists largely of fats, resins and oils, none of which are desirable in rayon manufacture. Some investigators have used benzene or alcohol as solvents, but their results are comparable with those secured by ether extraction.

The next factor in pulp selection is color or whiteness. In this property cotton linters pulp is best but it is closely approached by some chemical pulps. A white pulp yields a white rayon, with less need for finish bleaching. While the whiteness of pulp sheets can be measured by any one of the many colorimeters available, there is as yet no standard of whiteness for cellulose pulp for rayon production. The manufacturers of rayon are willing to accept the pulp makers' best product rather than insist upon heavy bleaching of the pulp which might result in degraded cellulose, lower viscosity, and weaker yarn. Also, since the whiteness of the pulp increases with the removal of impurities undesirable from the rayon manufacturers' viewpoint, premium prices are paid for high alpha-content pulps without using increased whiteness as a selling point.

As the purity and whiteness of the pulp increase, the copper and cellulose numbers usually slowly decrease in value. The copper number of a pulp is the weight in grams of copper reduced from boiling Fehling solution by 100 grams of pulp. In pulps suitable for rayon production, it may range from 0.5 to 2.0. The cellulose number of a pulp is the weight in grams of copper absorbed from Fehling solution at room temperature by 100 grams of pulp. For pulps satisfactory for rayon production, it ranges from 0.3 to 0.8. Subtracting the cellulose number from the copper number gives the "corrected copper number." This value is generally disregarded, and only the copper number is ordinarily used in rayon work.

The copper number, whether "corrected" or not, is a direct measure of the amount of reducing material in the pulp. The reducing material includes hemi-cellulose, the presence of which is detrimental in any rayon process. Rayon yarn containing it has a lowered breaking strength and increased sensitivity to heat and light, and does not possess satisfactory wearing qualities. The presence of these reducing materials distributed unevenly throughout the production of a rayon plant may also cause uneven dyeing.

Another specification for rayon pulps includes the amounts of material soluble in boiling 10 per cent potassium hydroxide or 7.14 per cent sodium hydroxide. The values generally found run from 3.5 per cent for some cotton pulps to 12 per cent for regular sulphite pulps. Usually, the alkali-soluble material is slightly higher than the hemi-celluloses determined as described above, and more nearly represents the cellulosic materials that cannot be recovered as rayon yarn.

The preceding discussion has disclosed that all rayon manufacturers prefer a pulp of high alpha-cellulose content (92 to 97 per cent on a bone-dry basis), low copper number (2 or less), medium viscosity in cuprammonium, low hemi-cellulose content (8 per cent or less), a low ash content (less than 0.1 per cent),

an ether extract of not over 0.05 per cent, and extreme whiteness, and soda-soluble material less than 5 per cent.

Since rayon is produced commercially by the viscose, cuprammonium and acetate methods in this country, we will consider the pulp demands of each process.

Viscose Process

The first step of the viscose process (112,300 tons of yarns produced in U. S. A. in 1937) consists of steeping the pulp in 18 per cent caustic soda. Most of the steeping tanks now in use are combined horizontal steeping and pressing frames, and hence the viscose process uses cellulose in sheet form. The time of steeping is limited generally to not more than two hours. The sheets used must be of such a width, length and thickness that they fit into the steeping frames, and of such consistency that, while wetting out easily, they do not disintegrate in the steeping process. If the sheet does not wet out easily, large amounts of cellulose fail to react with the alkali to form alkali cellulose. The unreacted cellulose carried through the process will clog the viscose filtering devices and cause expensive manufacturing delays. On the other hand, a sheet that disintegrates in the steeping tank is not only difficult to press free from excess caustic in the next step, but some of the sheet, dispersed as fine fibers, is carried off in the excess caustic and must be removed before the caustic can be further purified for reuse.

After the excess caustic has been removed by pressing, the sheets of alkali cellulose are transferred to kneading machines in which slow-moving, tooth-edged blades shred them to a fine crumb. In this process, the power demands are excessive if the sheets are too firm, but a good sheet, firm enough to retain its shape in steeping and pressing, can be shredded quite readily to a fine crumb.

A balance of sheet strength between these requirements gives a sheet that will hold through steeping and pressing and yet shred easily. Many pulp producers who have succeeded in this are out ahead today.

The viscose process uses cellulose pulp of not less than 85 per cent alpha-cellulose content, and the higher alpha-cellulose pulps are in much demand. When the price is right, many viscose manufacturers use mixtures of sulphite pulp and cotton linters. The ratio may be as high as 60 cotton to 40 sulphite, but varies from plant to plant and with the market. Cotton gives a stronger, whiter yarn and one which usually requires less bleaching. At present, the use of cotton linters is at a low level because the price is unfavorable, the new high alpha-content sulphite pulps being increasingly used. Some manufacturers have tried hard-wood sulphites, but there is as yet little commercial production with this type of cellulose.

While whiteness of pulp is desirable, the necessity for removal of sulphur from viscose yarn permits the inclusion of a bleaching process in the same handling. Consequently, viscose rayon producers can use pulps that are not as white as those demanded by acetate and cuprammonium producers.

In the preparation of cellulose for acetate rayon (36,400 tons of yarn produced in U. S. A. in 1937) the loose fiber form is preferred. Sheeted cellulose, sometimes purchased, must be easily disintegrated in the acetylating bath. In general, cotton and cotton linters are the preferred materials for acetylation. Whiteness is a highly desirable characteristic of the raw material, since acetate yarns require few finishing treatments before use in textile manufacture and additional bleaching of the product would be expensive.

Cuprammonium Process

The cuprammonium process (5,500 tons of yarn produced in U. S. A. in 1937) also uses cotton or cotton linters as its raw material in preference to sulphite cellulose. While the whiteness of the resulting yarn and its higher strength are significant considerations in this choice, the most important factor is that cotton requires less chemicals for dissolving, and therefore, the processing and recovering costs are lower. Consequently, purity of cellulose is the keynote, and cotton alone offers a satisfactory degree of purity for economical operation. Generally the producer buys the raw cotton and purifies it to 98-99 per cent alpha cellulose, controlling viscosity, whiteness, and purity at the same time.

The original Chardonnet or nitrate process is no longer operated in this country, though it is still in use to a limited extent in South America.

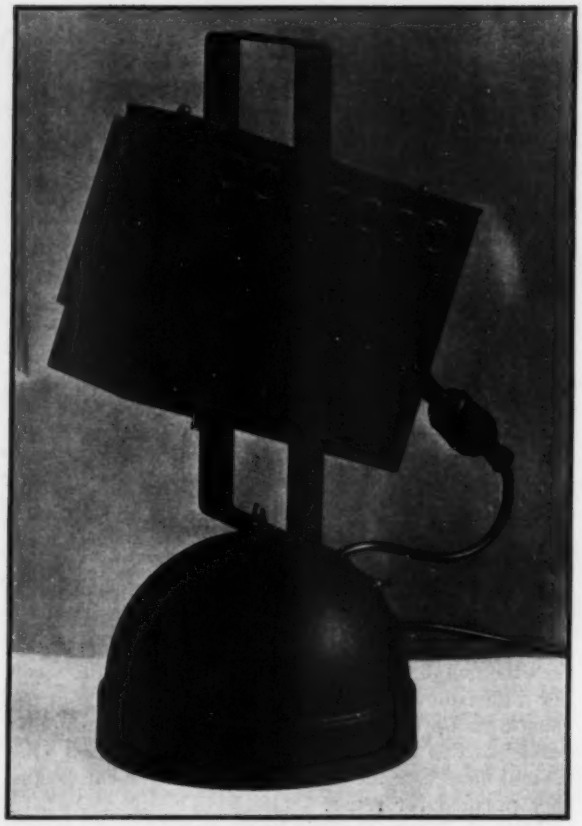
Representative analyses of pulps suitable for rayon production follow:

	Regular Sulphite	High Cellulose Content
Alpha Cellulose	88%	94%
Soda Soluble	12-14%	5-7%
Ether Soluble	0.5%	0.05%
Ash	.12%	0.10%
Copper Number	2-3	1-2

The last but most important characteristic of pulp for rayon production is uniformity. This is the objective of all the controls listed. Without careful limitations in each characteristic, the necessary uniformity of pulp is unattainable. To secure uniformity, the pulp manufacturers maintain large technical staffs, and to insure uniformity of finished rayon the rayon manufacturer tests each pulp shipment thoroughly before using. Usually pulp shipments are blended for use, either with successive shipments from the same plant, or with the product of other pulp plants, or even at times with cotton. This blending is done to eliminate any periodical variations of the pulp. It is characteristic of rayon production, that at every step in the process from raw cellulose to final solutions careful blending is employed to secure the utmost uniformity.

While the rayon producer strives for uniformity by blending, the pulp maker must similarly maintain the uniformity of his product, for it is his cellulose that becomes the rayon and nothing the rayon manufacturer can do will hide defects in the raw material. Consequently, not only the pulp maker but the rayon manufacturer, the textile weaver, and the ultimate consumer depend upon the control of the purified cellulose. The purer and more uniform the cellulose, the more rapid will be the progress of rayon as a major textile material.

Black-Light in the Paper Industry*



Black-Ray Quartz Lamp

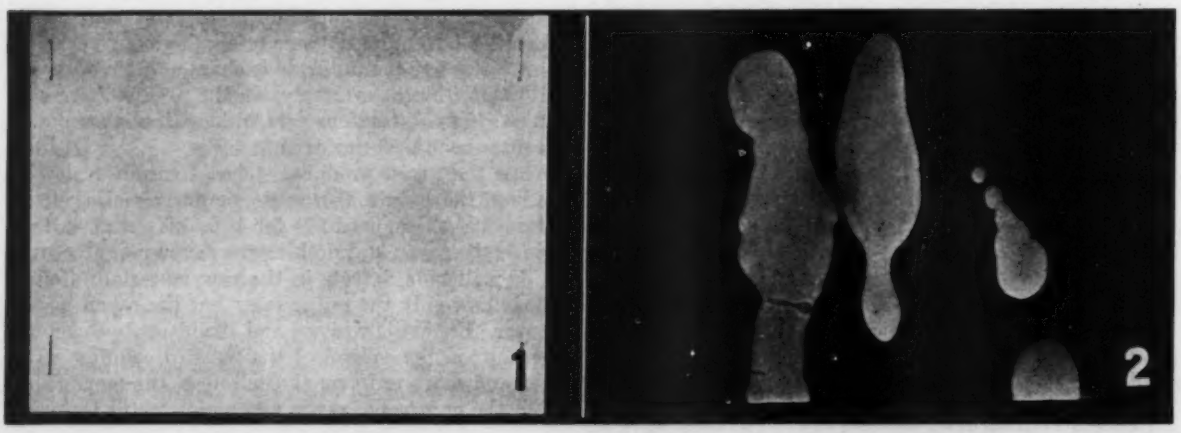
THE use of filtered ultra-violet light in paper laboratories is virtually universal in Europe and now this ultra modern tool of the paper chemist has been made readily available in this country by the presentation of a comparatively low cost, yet powerful, efficient and portable Black-Ray Quartz Lamp. Specially formulated dark-colored Wood's glass filters in the front of Black-Ray Quartz Lamps hold back the visible light emitted by the powerful quartz mercury arc and allow only a concentrated beam of invisible ultra-violet, or "black light," to pass. This ray cannot be seen by the eye, even in darkened or semi-darkened locations, yet its radiations are absorbed by a wide variety of substances and instantly re-emitted as visible light, of constant intensity and color.

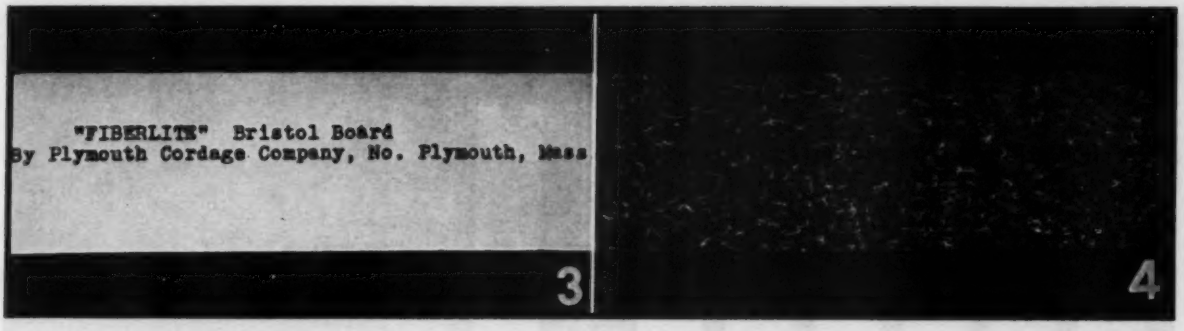
Such "fluorescent" substances act in a sense as "light transformers," since they change unseen ultra-violet light to visible colored light by changing the wave-length of the radiations absorbed from the lamp, and instantaneously give off this "transformed" energy in a wave-length which the eye registers as colored light. The brilliancy and color of such light emission, or "Fluorescence" differs with the substances examined. For example, some yellow dye stuffs fluoresce a vivid yellow, while others, apparently the same in daylight, fluoresce a dull greenish-brown because of different chemical and physical properties. Thus, the characteristic fluorescence or non-fluorescence of all materials, (which is governed by their chemical constitution), offers a simple, rapid and accurate means of visual identification, detection, comparison, analysis, sorting and testing with no injury to the sample. The following major advantages of ultra-violet examination are obvious:

(1) Simplicity
(2) Sensitivity
(3) Rapidity
(4) Flexibility

A great variety of substances which have no color and cannot be seen in ordinary light, (such as oil stains

(*)Submitted by New Developments Section of the Black-Ray Lighting Company.





on paper, for example), become instantly visible by their fluorescence when viewed in a semi-darkened room under a Black-Ray Quartz Lamp. Thus, ultra-violet light (itself invisible to the eye) causes many unseen stains, marks, blemishes and the like to fluoresce and become visible to the human eye and recordable by photography.

Detection of Stains and Blemishes in Ultra-Violet Light

The difference in the color and intensity of the fluorescence of spots of oil, starch, shive, "broke," scum, resin, etc., makes possible their identification in many cases in ultra-violet light though the paper may appear to be spotless in ordinary light. Figure 1 shows a piece of white blotting paper in Mazda light, with no blemishes or stains visible to the eye. The same piece of paper viewed under a Black-Ray Quartz Lamp presents a startlingly different appearance, as shown in Figure 2. The paper is dark, but oil stains fluoresce vividly.

Detection of Inequalities in Dyeings

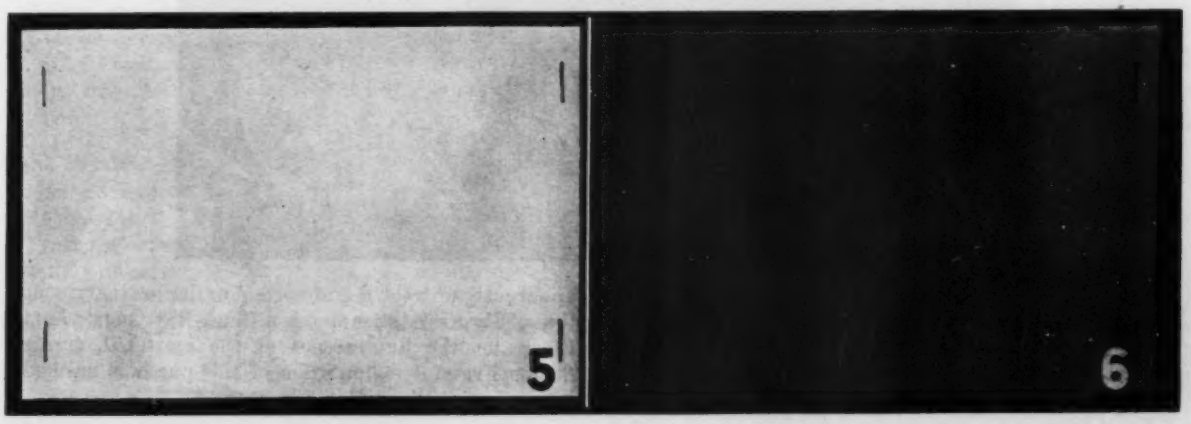
Uneven dyeings, shade differences and dyeing inequalities which are indetectable in daylight often become readily ascertainable under Black-Ray Quartz Lamps. Figure 5 portrays a piece of yellow paper photographed in Mazda light with no unevenness in the dyeing visible. Figure 6, however, shows the same piece of paper as photographed in filtered ultra-violet light from the Black-Ray Quartz Lamp. Here inequalities and unevenness in the dyeing are very readily apparent. Several small splotches and spots of especially brilliant fluorescences may be noted.

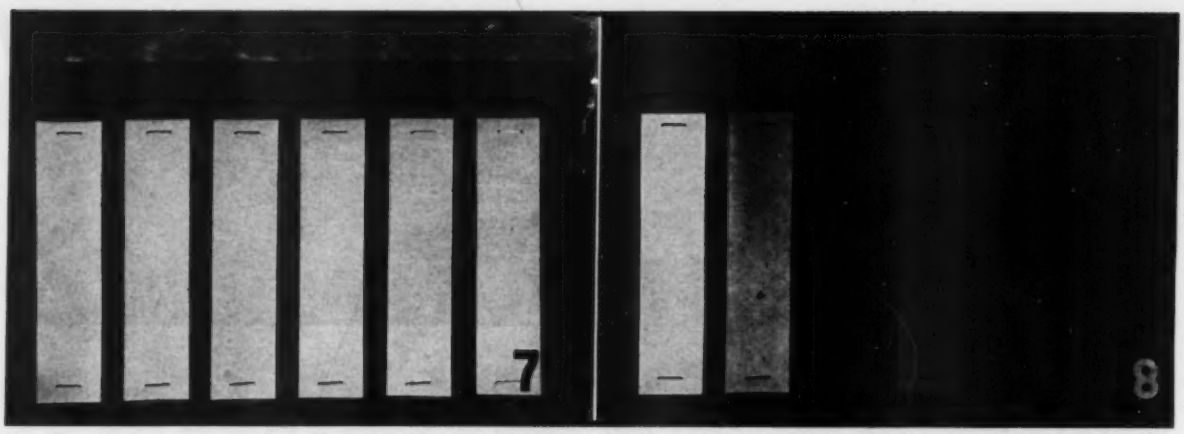
Shade differences unnoticeable in ordinary light are often likewise very obvious under ultra-violet light. Figure 7 was taken in Mazda light with six slips of common yellow paper as the subject matter. No inequalities were visible in ordinary light, although the camera has registered slight differences. Figure 8 shows the same series of yellow papers as they appear in the filtered ultra-violet light from a Black-Ray Quartz Lamp. Under this condition extreme differences in the shades and dyestuffs used are readily apparent.

Accurate Measurement of Sizing Values under Ultra-Violet Light

A very important use for ultra-violet light in the paper industry is in the measuring of sizing values or resistance of papers to penetration by water. The many methods for determining sizing values carry errors in the neighborhood of 10 per cent to 20 per cent because of the lack of a critical end-point. By the ultra-violet method described below and originated by J. Grant (see Journal *Society of the Chemical Industry*, 1934—53—349) the end-point is so very instantaneous and critical and the test period so rapid that errors of less than 5 per cent are obtained. "A mixture of Rhodamine 6 G (concentrated) and sugar is ground in a mortar and dried in a desiccator. If a two-inch specimen under test is sprinkled with this powder, floated in a bath of distilled water at 21 deg. C., and the penetration time is measured, errors of less than 5 per cent will be noted in the time required for a vivid orange fluorescence to appear suddenly in ultra-violet light against the black background of the paper when the dye dissolves due to moisture penetration."

A measurement of the grease penetration of the paper may be made in the same manner using a mineral oil





and any one of several oil soluble dye stuffs sold by this Company which fluoresce instantly when they are dissolved in the mineral oil which has penetrated the paper.

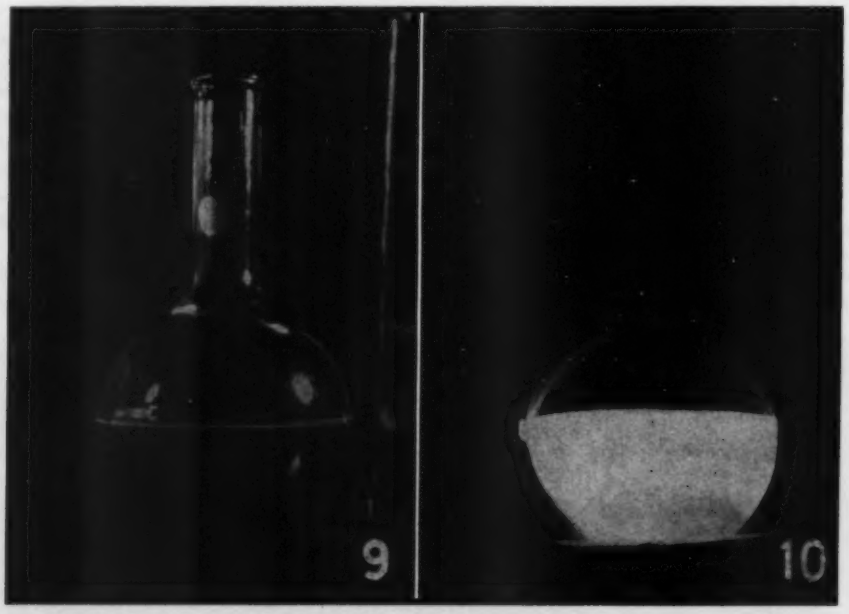
Ultra-Violet Titration of Colored Solutions

Since the fluorescence of many materials classed as fluorescence indicators changes in fluorescent color and intensity as the pH value changes, the field of fluorescence is naturally widened to include the titration of liquids, especially colored liquids, under this condition. If you are interested in complete details of the various indicators used and the technique employed in fluorescence titration work, we refer you to *Fluorescence Analysis in Ultra-Violet Light* by Radley & Grant. This book also includes a complete discussion of the uses being made in Europe of ultra-violet light in the paper industry and we highly recommend it if extreme detail is required.

Figure 9 portrays a flask of colored liquid as photographed in Mazda light. It is known such liquids are difficult to titrate accurately by normal methods because of the inability of the operator to note the color changes which take place at the end-point produced with ordinary indicators. This photo is in black and white and does not give a true picture of the appearance of this solution, which was dark blue in ordinary light, and which was photographed at the end-point as determined with ordinary indicators. Figure 10 portrays the same flask with another sample of the same blue liquid at the end-point, determined very accurately and rapidly in this case, by the use of an indicator which became fluorescent in ultra-violet light as the end-point was reached.

New Fluorescent Safety Papers

Notable among recently developed fluorescent "safety" papers is the "Fiberlite" series in which a small percentage of the total fibers are fluorescent. Figure 3 was taken in Mazda light to show that this paper is apparently untreated and normal under ordinary conditions. Figure 4, taken under a Black-Ray Quartz Lamp, illustrates the fluorescence of the scattered, treated, fibers. Fraudulent imitation of this paper is naturally an exceptionally difficult matter.



Fluorescent safety papers which have been coated or impregnated with sensitive fluorescent treatments are now used for checks, securities and other negotiable instruments. Although erasures on this paper may be made by highly skilled criminals, the most expert workmanship will usually appear as a dark smudge in ultraviolet.

Black-Light Is Used in the Paper Industry to—

Detect

artificial watermarks, unseen blemishes, oil spots, stains, invisible marks, etc.

certain chemicals in minute quantities, additions of as little as 2 per cent of sulphite (as "broke"), etc.

erasures, alterations, additions, eradications, fraudulent imitations, forgeries, etc., made on safety papers having fluorescent coatings or fibers.

Reveal

length and degree of cook of pulp, distribution of loading in papers, method of sizing, etc.

vividly fluorescent fiber (or coating) in certain safety papers.

structure of paper sheets, of surface as well as individual fibers.

invisible structural changes occurring in nitrocellulose films on light exposure.

whether lack of capacity is due to paper or to penetration of printing oil used.

inequalities in dyeings and shade differences which are indetectable in daylight.

Measure

chlorine numbers, degree to which pulp has been worked, extent of light absorption, degree of cooking of unbleached sulphite pulp, etc.

sizing value by highly sensitive test giving almost instantaneous end-point and error of less than 5 per cent.

resistance to grease penetration very accurately.

extent of deterioration of sulphate cellulose.

Differentiate

bleached from unbleached pulps, white from brown mechanical pulp, summerwood from spring-wood, and ansonia from manila and jute, etc.

top-side from under-side of papers, internal structures of fibers (e. g. the parenchyma and fibrillae).

various grades of papers, true parchments from imitations, constituents of mixtures which are absolutely uniform in daylight.

many apparently identical materials, structures, colors, etc.

Make Possible

a simple investigation of fibers of all kinds, accurate examination and comparisons of finished papers, raw materials, etc.

rapid and accurate titration of colored digester or soda-recovery liquor.

examination in detail of paper textures, punctures in sheeting, etc.

routine checks of bleachability by fluorescence of sheets drawn from a delivery.

instantaneous checking of large numbers of samples with no injury in ordinary light.

rapid means of "forecasting" fading, though no change is visible in ordinary light.

visual observation of many normally unseen chemical reactions, dyeings, etc.

Identify

blemishes on paper, whether from oil, resin, scum, starch, shive, colored broke, etc.

all products marked or printed with fluorescent inks, whether visible or invisible in daylight.

cellulose films, artificial leathers, specialty papers, etc.

Assure

purity and authenticity of deliveries of loadings, dyes, pigments, etc.

product uniformities with a great saving, by elimination of much costly analysis, sampling and microscopical investigation.

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The Paper Specifications of the National Government

ONE of the most important functions of the National Bureau of Standards is technical assistance in the development and improvement of purchase specifications required by the United States Government. Most of the contracts for supplies are awarded on the basis of competitive bidding on materials specified in detail.

Paper and paper articles constitute one of the largest classes of the purchase items, and the paper section of the Bureau has continuously devoted much time to specifications work. This includes services as members of committees, and testing and research to obtain required technical data or to develop testing apparatus.

Most of the paper specifications are dealt with by two committees. Those for papers used by the Government Printing Office are formulated by a committee appointed by the Joint Committee of Congress on Printing. This is composed of representatives of the Joint Committee, of the Government Printing Office, and some of the executive departments. A committee appointed by the Federal Specifications Executive Committee of the Procurement Division, Treasury Department, deals with all other papers and with paper articles. This committee is composed of representatives of the Federal Specifications Executive Committee and all executive departments. These committees meet regularly for consideration of proposed new specifications or changes in existing ones.

There are over 150 Government specifications covering a wide variety of papers, paperboards, and paper articles, and the technical requirments of a large proportion of them are based on information developed in the Bureau's paper section. The development work is always done with the cooperation of the industrial organizations concerned if this can be secured, and with very few exceptions, they have been most helpful in making certain that proposed specifications are in accordance, as far as possible, with commercial standards of quality and practice.

More Uniform Rolls on Drum Reels

A. M. COOPER, Industrial Division
Westinghouse Electric & Mfg. Co.

AN ingeniously simple electro magnet regulator is being used to maintain constant tension on the drum reel section of paper machines. Advantages derived from the use of this regulator include: more uniform rolls, the ease of adjustment of tension by means of a small hand rheostat, the ability to duplicate results by setting the rheostat for any tension found to be best suited for any given weight or grade of paper, and the practical elimination of the human element in adjusting the tension from time to time during the building up of a roll.

The plant of West Virginia Pulp & Paper Company at Tyrone, Penna., uses the regulator on a two-drum upright reel. In this case each drum of the reel is driven by its own gearmotor through a sliding type of coupling. A separate regulator is used for each motor and whichever drum is in use is driven by its own gearmotor and regulated by its own regulator. When a roll is full, the other drum is started and the paper started on it while the sliding coupling on the full roll drum shaft is disconnected. The full roll is then lifted with a crane to the rewinder.

Where it is not the practice to remove the full rolls but to unwind from their original position, the driving gearmotor can remain connected and will act as a generator, the output of which will be regulated by the same regulator. Thus, the same motor that is used to drive the drum when reeling paper can be used as a braking generator when unwinding and the same regulator will maintain constant braking effort on the unwinding drum.

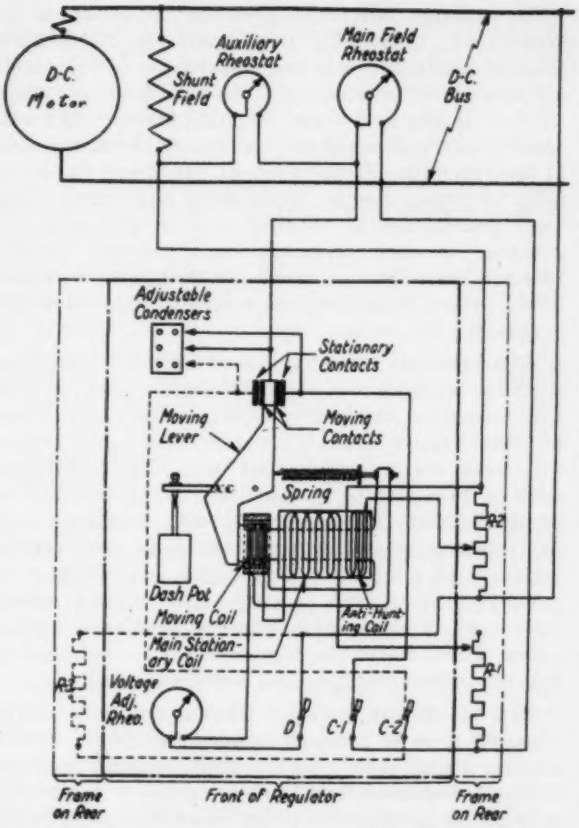
Another installation utilizes the same principle but makes use of a single motor and regulator on a three drum revolving reel. In this case it is necessary to use the mechanical band brake when unwinding, while the regulator takes care of maintaining constant tension when winding.

On the drum type reel, the paper coming from the calender is wound directly on a drum, the diameter of which increases as the amount of paper on it increases. This means that to maintain constant tension on the sheet the driven speed of the drum must change inversely to the diameter of the built up roll, to compensate for the increasing peripheral speed of the roll.

The usual mechanical method of reducing the driven speed of the roll is to provide a slipping belt between the driving member, whether it be the variable speed lineshaft or a sectional electric motor, and the drum. The slipping belt is adjusted so that it will transmit a predetermined definite horsepower and no more. As the roll builds up, the belt slips—thus allowing the roll to slow down in direct proportion to the increasing roll diameter. If an adjustment in tension of the sheet is required, it is obtained by adjusting the slipping belt to transmit more or less horsepower. If the tension of the sheet is to be reduced, it can be accomplished by applying a mechanical brake which will absorb some of the horsepower delivered through the belt and thus leave less horsepower to produce tension on the sheet.

It at once becomes obvious that the essential requirement of the reel section is constant horsepower and the newly applied regulator provides a means of maintaining constant horespower input to the reel drum. Since the regulator is a constant current device, it maintains constant current in-put to an electric motor, which slows down directly as the roll diameter increases. This means that from the empty to full roll,

Left—Control for two motor reel drive. Ammeter at top shows tension on the sheet and is adjusted by hand rheostat at the bottom. The regulator on each panel is enclosed in separate cabinet. Right—View of two-drum reel drive. Bottom motor drives through right angle gear unit



Schematic diagram of connections. The stationary coil is connected across the excitation source and the moving coil in series with the armature of the motor to be regulated. A rise in regulated current increases the flux in the air gap in which the moving coil is located. This, in turn, increases the magnetic force on the moving coil toward the main coil which opens the proper stationary and moving contacts against the pull of a spring. The contacts are connected across the motor field resistor and their opening inserts the rheostat resistance in the field circuit causing the regulated speed to vary as required Thus, it will be seen, for a given motor current, there is a corresponding effective resistance and current corrections are made by the regulator thru changes in time of contact engagement. The regulator is adjusted so that the value of regulated current which it is to maintain is such that the average coil pull just balances the spring pull and the current corrections made by change in time of contact engagement. The rate of contact vibration is forced and is normally subject to change within limits

the speed is constantly decreased to keep constant horsepower output and consequently, constant tension on the sheet.

On machines which are equipped with sectional electric drives the section driving motor is provided with this regulator. On machines which are mechanically driven however, the regulator is easily applied by driving a small, separately excited d.c. generator from the variable speed lineshaft and connecting it to a motor for driving the reel controlled by the regulator. Since the voltage output of the generator will vary with the speed of the lineshaft, the speed of the reel motor will also vary. Thus, for any changes in paper speed the reel motor speed changes because of changed generator voltage, at the same time that the regulator maintains constant current.

The regulator is of the vibrating contact type and operates on the simple and positive electro-dynamic or moving coil principle. It controls the speed of the d.c. motor by rapidly cutting in and out resistance in the motor shunt field circuit.

The air gap in the magnetic circuit is considerably longer than the moving coil inserted in it. Thus, the latter can travel back and forth without getting beyond the edges of the air gap and therefore, always moves in a constant magnetic field. The result of this feature is that the pull corresponding to a given coil excitation is constant and independent of coil position.

To prevent hunting action of the regulator and to make its operation positive and stabilized an anti-hunting stationary coil and an adjustable register are provided. These enable each regulator to be individually adjusted for the best performance with the machine to which it is applied.

This system of drive has been found to be very flexible and can be applied to a wide variety of reels under widely varying conditions.

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Importance of Clean Steam in Paper Mill

W. F. SCHAPHORST, M.E.

DO YOUR valve discs wear out quickly? Do you find deposits of scale or dirt in your engine cylinders or turbine blades? Are slugs of water carried over with the steam?

Troubles of this type are common in these days of high steam velocities, high steam temperatures, and high steam pressures. Deposits of scale or dirt are frequently found in engine cylinders and on turbine blades. Sodium sulphate, dirt, and calcium carbonate are the principal offenders. Not only do the impurities clog but they cause damage by cutting nozzles, turbine blades and valve discs, making traps and valves inoperable and ruining engine cylinders. Water slugs knock out or loosen blades and buckets and cause pounding and vibration.

To avoid these troubles one of the simplest methods is to install a steam purifier, the function of which is the elimination of moisture. By getting rid of the moisture all dirt is eliminated because the water in the steam is what carries over the impurities. Dry steam cannot and therefore does not carry scaling impurities or dirt.

In addition there is a thermal saving. This saving is sometimes small and again it amounts to a worthwhile yearly sum. By removing all moisture, the steam is more easily superheated. From a heat standpoint, when using superheated steam, one can count on an increase of about 17 deg. to every one per cent of moisture removed.

If you operate a turbine, there will be a reduction in steam turbine water rate of 1 per cent for every 12 deg. increase in superheat. If 2 per cent of moisture is removed the superheat will increase 34 deg., which will be equivalent to almost 3 per cent reduction in turbine water rate. You can easily figure for yourself what this amounts to during an entire year.

Paper Mill Felt Washing

Dr. R. W. MITCHELL, Technical Director
Magnus Chemical Company

THE washing of paper mill felts is a subject of importance by reason of their expense and relatively short life, and because of the importance of their proper functioning in the operation of making paper. Paper mill felts are made from wool fiber, generally of very high quality. The maintenance of a felt in its original condition of softness, porosity, and uniformity of surface, and the holding of its nap are decidedly influenced by the treatment which it receives during its necessary reconditioning or washing to free it from the loading which it acquires during its use.

The primary function of a paper mill felt is to absorb water. The softer, the more porous and open it is, the better it functions. The more water the felt is able to withdraw from the web, the less water is delivered in the sheet to the dryers. Because the felt loads up with solid matter, frequent washing is necessary. Yet these washings often partially defeat their own purpose. The use of alkalies, or improper soaps, hardens, compacts and slowly destroys the felts.

Wool is a protein, a material reactive chemically, and which can undergo physical and chemical changes very readily. Most changes which it undergoes impair the qualities which make it valuable as a textile fiber. Wool is most susceptible to the action of alkali. Dilute alkaline solutions react partially with wool dissolving out part of the fiber and making it weak and brittle; strongly alkaline solutions dissolve wool completely. Wool resists dilute acid solutions fairly well, although some of the acid is withdrawn from the solution forming an addition compound with the keratin of the wool. Strong solutions of mineral acid destroy wool fiber. Oxidizing and bleach solutions also affect wool. With bleaching powder or chlorine solution, a product called chlorinated wool is formed; the fiber becomes glossy, harsh, and loses its felting property.

The proteid which forms wool, has pronounced properties of a colloidal nature. It has a certain affinity for a large variety of other substances which leads to the formation of compounds with them, by a sort of physical, rather than chemical, union. Such colloidal aggregates which form between wool and a wide variety of other substances such as metallic oxides, acids, salts, dyestuffs, pigments, etc., often are very stable, and difficult to revert.

Wool fiber is sensitive to heat, and if exposed to a dry temperature of over 100 deg. C. the fiber soon becomes discolored, harsh, and brittle. In washing wool temperatures of 100 deg. Fahr. or 40 deg. C. are best.

In washing felts, the problem presented is to rapidly and thoroughly impregnate the felt with a solution which will free and disperse the loading matter present, without injury to the wool fiber, or alteration of its physical form (elasticity, nap, etc.) and rinse freely and completely in the final rinsing step of the operation. To be practical, the means employed must obviously also be inexpensive and simple. Efficient penetration or wetting is of considerable importance in such processes since intimate contact between the soiling or loading matter must be established before the subsequent stages of dispersion and suspension can occur.

A surprisingly large number of materials have been used for washing felt—simple alkalies, such as soda ash, trisodium phosphate, sodium metasilicate, soaps of various types, both high and low titer soaps, potash and soda soaps, sulphonated oils, soap substitutes, such as those formed by combining alkali with starch, sulphated fatty alcohols, naphthalene-sulphonic acid derivates, soap and solvent emulsions, and various mixtures of all these. Dilute acid (as muriatic) is even sometimes used. Lately, acid wetting agents have been found to give excellent results in certain cases. These materials, sulphonic acids, combine acid solvent power, wetting, and detergent abilities.

The use of any strongly alkaline solutions in felt washing is to be strongly condemned. Wool fiber is rapidly attacked by alkaline solutions with resulting stiffness, harshness and loss of tensile strength. It is a fact that alkalies are today commonly used in felt washing. Some use soda ash because it is already available in most mills and is cheap. Sodium metasilicate has been recently promoted for all kinds of washing, and actually has been recommended in advertising for felt washing. It is extremely destructive to wool. The same is true of trisodium phosphate.

In the past many types of cleaning compounds, based on trisodium phosphate, have been advocated for felt washing. These have had some success, principally because in their use no soap was left in the felt to cause later stiffening and waterproofing. Trisodium phosphate, as apparent from the figures in the table below, in any appreciable percentage is much too alkaline to be a proper material for felt washing. Even when carefully used there is undoubtedly considerable weakening and harshening of the wool fibers.

For successful detergent action the alkalinity of a washing solution for wool should be at least pH of 9, which is about the degree of alkalinity given by a dilute solution of what is known as a "neutral" soap. Laundry research has indicated that the optimum pH for detergent processes is around 10.4 to 10.6. This degree of alkalinity may be safely used in wool washing if the temperature is kept low, best at 100 deg. Fahr.; never over 120 deg. Fahr. Liability of damage to fibers increases very rapidly, however, when the pH of the washing solution rises above 10. This is especially true as temperatures are increased. The accompanying table shows the pH values at different concentrations of simple alkalies and indicates their unsuitability for wool washing.

pH VALUES AT 25 DEG. C.

Concentration, Per Cent....	.25%	.5%	1.0%
Soda Ash	11.0	11.1	11.2
Trisodium Phosphate	11.5	11.7	11.9
Sodium Metasilicate	12.1	12.5	12.8
Caustic Soda	12.5	12.8	13.0

A comparison of alkalinity of several other materials in 1/10 normal solution at 25 degrees is given below:

Sodium Bicarbonate	8.4
Borax	9.2
Ammonia	11.1
Sodium Carbonate	11.6
Trisodium Phosphate	12.0
Sodium Metasilicate	12.2
Sodium Hydroxide	13.0
Sodium Oleate	9.5
Sodium Sulf-oleate	7.5

It is a fact that alkalies are used. This, in the author's opinion, does not demonstrate their applicability in the face of the above arguments but rather proves that indifferent results and higher felt costs are of less importance to some operators than to others.

Soaps are much better washing agents than alkalies. They have much greater penetrative effect and much greater dirt suspending value. The most widely used washing formulae, particularly in the laundry trade, consist of soap solutions, "built" with some mild alkali in sufficient amount to raise the pH of the soap solution from its normal value of about 9 to 9.5 up to the pH of 10.5 mentioned above as the optimum point for most effective detergent action. Alkaline solutions alone have no wetting or penetrating effect. These effects are proportional to the surface tension of the solutions and a measure of the latter is a simple method of evaluation of the relative wetting powers of different solutions. The surface tension of water at room temperature is around 76 dynes per square centimeter. The addition of alkalies to this water has practically no effect, as is shown by the data in the following table. The addition of small percentages of colloidally active materials such as soaps and sulphonated oils, however, have very pronounced effects, reducing the figure from 76 down into the range between 20 and 30. A combination of these with alkali gives the most effective washing formula.

SURFACE TENSION IN DYNES PER SQ. CM. AT 23 DEG. C.

Distilled water—76		
Solutions of	1%	2%
Soda Ash	76	77
Trisodium Phosphate	76	76.2
Borax	76	76.2
Sodium Silicate	76	76.3
Sodium Oleate	28	...
Sodium-Sulphonated Oil	33	...

Relative wetting effects may be very roughly judged by floating inch squares of felt upon the surface of the solutions to be compared and noting the seconds' time required for complete wetting and displacement of enclosed air and sinking of the felt.

Under the general heading of soap there are included many types: high titer soaps which contain a high proportion of high-melting fats, such as tallow or palm oil, in which there is a considerable percentage of stearic or palmitic acid soap; or it may be a low titer soap, such as made from certain vegetable oils, as olive, and in which oleic acid predominates. The high titer soaps are completely unsuitable for wool washing. Even very dilute solutions gel when cold. They are difficult to rinse completely. They hydrolyze to a greater extent than the low titer soaps, and from them a higher per cent of fatty acid is adsorbed upon the wool fiber. The low titer soaps are much more freely soluble, rinse better, and hydrolyze less. When soap is used upon felt, it is this type which is most suitable, and the lower the titer of the soap stock used, the more suited is the soap for felt washing. Castor oil gives one of the mildest, most soluble and freest rinsing soaps. If soap is to be used, one from vegetable oil or low titer red oil is best specified.

For many years it was thought that potash soaps were more satisfactory for washing wool than soda soaps. This was particularly so in the wool-scouring trade. The importance of this point led to considerable research, and the conclusion has now been reached that the soda soaps are actually more satisfactory for wool washing, by reason of the fact that they hydrolyze somewhat less than the potash soaps, and hence leave less adsorbed material in the fiber.

The use of potash soaps for felt washing is not common. In general, soda compounds are used, because of their lower cost and much greater general availability.

Even the best soaps, however, have a serious drawback for felt washing. Some soap is always left adsorbed upon the wool fibers, even with excellent rinsing. This soap will react with lime hardness in the water used, or with alum in alum-treated water, or with any ingredients of this nature used in beater sizing. These form waterproof, insoluble films, coating the wool fibers, which greatly interfere with the satisfactory functioning of the felt.

A process similar to this is actually the basis for waterproofing textiles; they are first soaked in a dilute soap solution, then in a solution of alum, forming an insoluble metallic soap deposited about each fiber which makes it water-repellent.

The following figures are given in an article on "The Adsorption and the Retention of Soap by Wool," by Woodmansey which appeared on page 169 of the *Journal of the Society of Dyers and Colourists* (1919). It was shown that wool cloth was capable of adsorbing fatty acids from dilute olive oil soap solutions (in the form of acid-soaps). The amount adsorbed under the conditions of the experiment varied from approximately one-fourth to one-half a per cent on the weight of the goods. One sample soaked in soap solution and briefly rinsed contained .86 per cent fatty acid. After again rinsing in cold water this was reduced to .80 per cent. After rinsing seven minutes in hot water this was reduced to .50 per cent;

and a further hot rinse of thirty minutes only decreased it further to .41 per cent. The presence of some alkali in the soap solution reduces the amount of hydrolysis of the soap and cuts down the adsorption of acid soaps by the fiber. Further discussion of this and related subjects may be found in reprints of papers presented at a Symposium held at London in 1937 on *Wetting and Detergency*. These have been published in book form by the Chemical Publishing Company of New York. It has been found, however, that even under the best conditions of operation with soap that more satisfactory felt-washing results may be obtained with other materials. Soap substitutes, such as the alkali derivatives of starch, have been used but have never become popular. Recently, synthetic soaps or soap substitutes have been developed which avoid some of the drawbacks inherent in ordinary soap, in that they are proof against precipitation with lime and do not undergo hydrolysis. Such materials are the fatty alcohol sulphates and various types of organic sulphonic acids, which have appeared under a multitude of trade names. These latter materials are very effective but have been subject to a serious drawback of a very high price.

The soaps of sulphonated oils are beginning to be used more. Sulphonation renders the soap free from the precipitation of insoluble soaps in the presence of hard or alum-treated water, diminishes the hydrolysis of the soap with the result that less of it is adsorbed by the wool fiber, and there is increased solubility and rinsibility. These advantages are gained, however, by some sacrifice in detergent properties. Properly selected sulphonated soaps in conjunction with a moderate amount of mild alkali forms a very satisfactory felt-washing material. To such washing mixtures are often added, in small percentage, various types of solvent which may have both detergent and penetrative effects. Pine oil, trichlorethylene, hexalin, etc., have been so used. Such solvent soaps are particularly valuable for removing oil stains or pitch spots from felt.

In general, it may be said that a washing solution which will thoroughly penetrate felt and can be completely rinsed afterward will be found satisfactory, as the actual removal of the dirt load is not in itself difficult. Given thorough penetration and wetting and complete rinsibility, you are pretty sure to have a good felt-washing solution.

Some use acid to remove lime soaps which build up in the felt. A number of cases which I have knowledge of have washed the felts in one per cent muriatic acid. Sometimes this is done right on the machine. This is a very harmful practice as it stiffens the felt and is apt to develop in it hard spots and, of course, the corrosive effect of the acid upon the machine is highly undesirable.

Sodium hexametaphosphate has recently come into vogue in the laundry and textile fields for the removal of lime soaps from fabrics. It is generally used as a rinse, following a washing with soap. Such treatment would undoubtedly benefit felts but the cost would probably be prohibitive.

In general, for felt washing, we recommend saturating the felt with a one per cent solution of the washing agent at a temperature of 100 to 120 deg. Fahr. When the felt is removed and run in a felt washer, the usual practice is a 20-minute wash period, followed by two 10-minute rinses with water at 120 deg. Fahr.

Shrinkage is occasioned by sudden changes in temperature, and it is desirable to have the rinses at the same temperature as the wash. Felts should not run in the washer longer than is necessary to thoroughly loosen the dirt, stock, sizing, etc., which is present in the loading. Once the fibers are thoroughly penetrated and wet by the solution, the loading materials will be freed and the rinses will carry them away.

One important feature in the care of felts, frequently overlooked, is in the drying. After a felt is taken from a washer and is not to be immediately replaced upon a machine, it should be hung up in such a manner that it can readily dry. The writer has seen cases where they were dumped in a heap on the floor. Wool, under such conditions, may rapidly deteriorate.

Where felts are washed upon the machine, the felt may be saturated with a spray from a perforated pipe across the width of the felt, which is fed from a stock tank operated by either air pressure or gravity. It is common practice to have such a stock tank of, say, anywhere from 50 to 500 gallons at some elevated point in the mill, where the solution can be fed to the points of use by gravity. It is an advantage to have an open steam pipe leading into such tank, both to warm up the solution and to aid in rapid dissolving of the added washing material, as the injection of open steam gives excellent agitation. Ordinarily, a one per cent solution is made up, which is approximately 10 pounds to each 100 gallons of water. Often the felt is roped up. After being run, the felt may be turned, reversing the edges. Rinsing is accomplished by turning on the showers. Such a washing on the machine is usually accomplished completely in 15 to 20 minutes.

Several large mills have found it most practical to have a large overhead solution tank piped to showers on each machine which are used for saturating the felt with cleaning solution. This is used not only for periodic reconditioning of the felt; it is also used when putting on a new felt, for softening it and shrinking it into place. One of the largest felt manufacturers recommends that cleaning solutions be thus applied evenly through a shower. One mill has a 100-gallon pressure tank on a four-wheel truck. This is transportable alongside any machine and the solution is sprayed on to the felt by compressed air which is charged into the pressure tank. Many mix the solution in an open tank or drum and saturate the felt by pouring the solution on with a pail or dipper. This is the most simple method and will, of course, work, but is not so convenient or neat as the previously mentioned procedures.

FELTEX is a material especially made for the breaking-in and reconditioning of paper mill felts, embodying the latest idea and best practice in this field. It is free from the several drawbacks attendant upon the use of soaps. It is economical in use and acts rapidly and thoroughly.

This material, in one per cent water solution, immediately and completely penetrates a felt, putting it in soft and evenly absorbent condition. It is of such a nature that it does not form insoluble precipitates to load the fibers as commonly results when soap com-

pounds are used and there is alum or hardness in the water.

The material is so mild that it has no destructive or weakening action upon the wool fibers as have alkaline materials. In addition to the great advantages of increased production, due to less slowing down of the machine and less shutdowns for washups and for felt changing, the use of FELTEX pays for itself alone in reduction of the annual felt bill.

FELTEX applied to a new felt, eliminates the necessity for the usual breaking-in period. A felt which has been just shrunk on and wet with a one per cent solution will immediately function perfectly. It promptly removes wool oil, improving absorption and eliminating all difficulties from "blowing" or "ribboning," and it improves "pick-up."

A felt which has lost its porosity by being waterproofed with lime soaps is renovated by FELTEX. Maximum felt life is secured through its use, as, due to the low alkalinity, there is no chemical attack upon the fiber; and by keeping the fibers soft and resilient, mechanical wear has less effect upon them; and the nap is retained longer.

FELTEX for normal work is made to give a solution of pH of a little over 10, as this is the optimum point for most effective washing action. There are cases, however, where it is desirable to treat or condition the felt with a strictly neutral material. This is important where the felt is to be reconditioned while operating and making paper or in the treatment of felts used upon such materials as tissue, etc. For such requirements a neutral modification known as NX is made, which fulfills the requirements satisfactorily.

Quite a few mills make a practice of saturating their wet felts with a one per cent solution of NX and leaving this solution in the felt during week-end or other shutdowns. This insures perfect operation of the felt promptly upon starting up again.

One of the largest board mills has rigged up an overhead tank pump and shower, and two or three times during every run saturates the wet felt with a one per cent solution of NX. This results in maintaining absolute uniformity in their felt, eliminates hard spots and improves waterproofing to a noticeable extent. This treatment in this case increased felt-life by one week 25 per cent. In a test with this material it was noted that on one washing where the vacuum gauge beforehand read 10 inches, following such washing right on the machine, the gauge had dropped to five inches.

The direct cost of the felts themselves and the indirect costs influenced by their condition, such as shutdown time for cleaning or changing, and the amount of steam supplied to dryers to remove water which should have been removed by the felts, makes a study of the most effective method for keeping them in good condition of considerable importance. The author recommends where it has not been done, that investigation be made of the newer materials available for felt washing and detailed records be kept over an extensive period which will bring together all the related phases enumerated above. In several cases within his knowledge, such studies have given a very satisfying return for the time and money so expended.

Connecting Motor to Load*

A FEW precautions should be taken when connecting a motor to its load. Couplings should be accurately aligned, and thrust caused by operation of the coupling should be prevented. Pinions and pulleys should be mounted as close to the motor-bearing housing as possible so as to keep the load on the bearing and the bending stress in the shaft as low as possible.

Chains should be run with a slight amount of slack. Gears should be uniformly across the teeth as indicated by the bright surfaces appearing after they have been carrying load for a short time. The teeth of gear and pinion should not be meshed too deeply. Their engagement should be adjusted so that a very slight amount of backlash is present. In self contained gear units the proper adjustment is built into the assembly. However, when a pinion is overhung on a motor shaft extension and lined up with open gearing, adjustment must be made during installation. As far as possible avoid the use of pinions having a pitch diameter smaller than twice the diameter of the standard NEMA shaft extension.

Pulleys should not be less in diameter than the minimum recommended by NEMA for mounting on motor shaft extensions. Belt speeds should be limited as far as possible to a maximum of 5000 feet per minute. At higher speeds the centrifugal force of the belt travelling around the pulley becomes so great that excessive tightening becomes necessary to prevent slippage. The total belt pull should not be greater than three times the torque of the motor load, expressed in pounds pull at the surface of the pulley. Further tightening of the belt unduly stresses the shaft and overloads the bearings. In the case of pulsating loads especially for large motors it is well to use an idler pulley with flat belts. Such a pulley is placed rather close to the motor pulley in such a way as to increase the wrap of the belt around the motor pulley, thus avoiding belt slippage at peak torques with normal tightening of the belt. Idler pulleys should preferably be spring or gravity actuated, supported on a lever arm from a suitable pivot point.

In any case belts should be tightened just enough to carry the load without slipping. When flat belts are used the center distance should be such that at least 160 deg. arc of contact of belt with the smaller pulley of the two is obtained. Vee belts are commonly used with quite short centers with resultant small arc of contact in some cases. The wedging effect of the belts in the grooves usually more than compensates for the small arc of contact so that when the proper number and size of belts is used the load on shaft and bearings will be not more, and often less than with ordinary flat belt drive.

(*) Excerpted from article entitled "Application, Maintenance and Repair of Electric Motors," by J. L. Brown, Industrial Motor Engineering, Westinghouse Electric & Mfg. Co., published in February, 1938, issue of *Electrical Maintenance*.

Paper Sketches ---

DURING THE GAY 90'S, PAPER WAS USED QUITE EXTENSIVELY IN THE MAKING OF BICYCLE FRAMES AND IN THE MANUFACTURE OF CYCLISTS' SHOES AND LEGGINGS.
SO FLEXIBLE WAS THE PAPYRUS USED BY ANCIENT EGYPTIANS, THAT ROLLS OF THE SUBSTANCE, UNEARTHED BY SCIENTISTS AFTER CENTURIES OF DRYING, COULD STILL BE ROLLED AND UNROLLED AFTER REMOISTENING.
DURING THE LATE 1700'S, FRENCH LADIES OF FASHION CONSIDERED IT "QUITE THE THING" TO HAVE DIFFERENTLY COLORED STATIONERY FOR EACH DAY OF THE WEEK.
NEWSPRINT 11% INCREASE.
1936
1937
NORTH AMERICAN NEWS PRINT PRODUCTION DURING 1937 APPROXIMATED 5,000,000 TONS, AN INCREASE OF MORE THAN 11% OVER THE OUTPUT FOR 1936--THE PREVIOUS RECORD.

A.P.P.A. Has Record Attendance at 61st Annual Meeting

THE sixty-first annual convention of the American Paper and Pulp Association and numerous affiliated organizations held in the Waldorf-Astoria Hotel, New York, on February 21 to 25, inclusive, was largely attended, hundreds of leading paper mill executives from various parts of the United States and Canada flocking to New York for the yearly get-together of the industry. In fact, although no statistics on the matter are compiled, it was a consensus of opinion among those present that the attendance at this year's convention exceeded all former records. Judging by the large attendance, the prevailing general business recession served to attract paper manufacturers to the convention rather than to deter them from attending.

The keynote of the convention was sounded by D. C. Everest, president of the American Paper and Pulp Association, upon his arrival at the Association's convention headquarters in the hotel. "The most important job before industry today is to promote confidence in values," he said. In commenting on the fact that in recent months industry has been looking to Washington for some statement that will generate confidence, Mr. Everest said:

"It seems to me that, much as assurance from the Federal Government is needed, the most immediate need lies before industry itself. Consumers want to know that purchases can safely be made at the present time."

"In most divisions of the paper industry basic economic conditions are good," Mr. Everest continued. "Moderate increase in production rates since the beginning of the year indicate that accumulated stocks are pretty well reduced. Price cutting has not shaken the industry's price structure, for costs promise to be even higher in 1938 than in 1937."

Re-elect President Everest

Mr. Everest, who is vice president and general manager of the Marathon Paper Mills Company, Rothschild, Wis., was re-elected president of the American Paper and Pulp Association for the ensuing year. The following A.P.P.A. vice presidents were elected for 1938:

William H. Anders, Nashua River Paper Company, East Pepperell, Mass.

Hugh J. Chisholm, Oxford Paper Company, New York City.

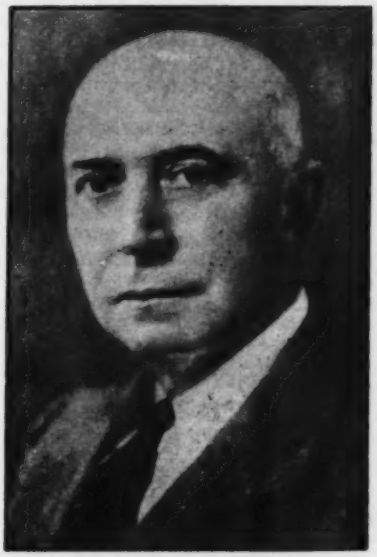
Stuart B. Copeland, Northwest Paper Company, Cloquet, Minn.

Richard J. Cullen, International Paper Company, New York City.

Ralph A. Hayward, Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.

H. L. Jenkins, Geo. O. Jenkins Company, Bridgewater, Mass.

John R. Miller, West Virginia Pulp and Paper Company, New York City.



D. C. EVEREST
Re-elected President

Walter J. Raybold, Rising Paper Company, Housatonic, Mass.

J. L. Riegel, Riegel Paper Corporation, New York City.

F. J. Sensenbrenner, Kimberly-Clark Corporation, Neenah, Wis.

C. Alfred Wagner, Stevens and Thompson Paper Company, New York City.

Norman W. Wilson, Hammermill Paper Company, Erie, Pa.

J. D. Zellerbach, Crown-Zellerbach Corporation, San Francisco, Cal.

President's Annual Address

"For the sixty-first time we are gathered here as the representatives of one of the most necessary industries on earth," said President Everest in his annual address before the A.P.P.A. Board of Governors' meeting in the Le Perroquet X Room of the Waldorf-Astoria on the afternoon of February 24. "Last year, in making his annual address, Mr. Sensenbrenner said, 'American industry has at last responded to the influences of economic revival. A broad period of prosperity seems to lie ahead. The opportunity for the pulp and paper industry to share fully in this prosperity seems clearly defined.' He also called attention to the fact that 1936 was an all time record for paper consumption.

"What looked like a return of business activity on a reasonable basis turned out to be the greatest example of extremes we have ever seen. From the highest to the lowest rate of operation in less than six months was the record of 1937. Despite the precipitate drop during the last few months, 1937 stands as the all time peak of paper production.

New High in Production

"North American newsprint production reached a new high figure of 4,944,000 tons or a half million tons more than in 1936. It is interesting to note that Canada produced 74 per cent; United States 19 per cent; Newfoundland 7 per cent. Canada's increase was 455,000 tons or 14.2 per cent over 1936.

"Board production exceeded all previous years. The amount of square footage entering into the manufacture of boxes was by far the greatest ever known.

"But with these record breaking performances for the overall yearly period, the months of November and December showed about as low a rate of operation as we have seen for years.

"The one important feature of this spectacular performance was the fact that the price structure did not collapse. This was undoubtedly due to the rapidity with which the drop in business occurred. Had this been a gradual decline in tonnage placed, the sharpshooting incident to such a slump would probably have wrecked the whole price structure.

"During the past year there have been constantly increasing costs, particularly in labor, wood and coal. Added payroll taxes and other taxes have also contributed to rising costs. Manufacturers have become cost conscious and they have displayed good sense in the way this recent slump has been handled. No one can make any money on recent rate of operation. With a turnover, in normal times, of once the capital invested each year, no one can become very effluent on a fifty-three per cent operation.

"Last year, as Mr. Sensenbrenner stated, we were looking forward to a well sustained business; whereas this year, if you judge by the past three months, the outlook is not so rosy. If, however, you will analyze the gradual increase in business in the several divisions each week, you will see that we are gradually recovering our position. Any favorable news may set us off at a rapid pace. When you think of the purposes for which our products are used and the rate of increase in consumption over the last few years, it is only logical to suppose that our business for the year 1938 will at least equal 1936. Once a new use for paper is developed, it is seldom discontinued, and new uses are being developed every day.

No Cause for Alarm

"I cannot get excited about the pres-

ent situation. It is probably true that producers of newsprint may have several months of low rate operations, as publishers and merchants undoubtedly loaded up in anticipation of the higher contract price, and there will not be much activity until those inventories are exhausted.

"In almost every other line there is evidence that inventories have been depleted. Merchants and consumers have been working on inventories for several months and these are bound to be used up shortly. The kraft paper industry is a good example. Everyone thought there were large inventories of kraft on hand and yet for the week ending February 5, the new orders placed amounted to 21,395 tons, or at the rate of over 1,100,000 tons per annum. When you compare this with the low weekly average of 12,450 tons for November and December, you will note there is a decided pick-up in demand for kraft.

"Other divisions are showing similar trends. We are on our way out of this temporary slump.

"I am not so much worried about demand for our products as I am about the things which may be thrust upon us through governmental or legislative action. If there was ever a time when we needed a good strong association, it is now. When we go through slumps as we have recently, there seems to be a wave of economy sweep over the industry and the first thing some people think of is to try and cut out association dues. This always occurs when they need their association most. I strongly urge that you do not cut your budgets on association work. It may be necessary to spend more to protect yourself and your industry.

"Let us not lose our sense of proportion. We have a good association supported by a number of good divisional associations. The personnel is good. They are loyal and they have no limit of working hours. They are as much interested in their work as though they owned the industry. We are set up to do the things and to give you the factual data required in your business.

Problems Ahead

"This year we are faced with some very serious problems. Perhaps the first will be the contemplated reciprocal trade agreements with Great Britain and with Canada. The Secretary of State has included numerous grades of paper in his proposed list of products which may be affected. I doubt very much if there has been any pressure from Canada to have these papers included, yet they are in the list and we must prepare to defend ourselves against such action. It is not the difficulty we may have from Canadian imports alone, but the moment such reduction is made in the Canadian agreement, it is automatically extended to all other countries with which we have agreements. We are still making readjustments in domestic production due to the Reciprocity Act of 1911. Someone must look after our interests and we must have unified action. Where can we get it except through this Association? Any tinkering with the tariff in times like these is bound to work serious hardship on the industry and through it on the men who are employed in it. This industry has done a good job in maintaining employment and a high rate of wage, but we cannot continue to do this if we are to lose such tariff protection as we now have. I know that the two International Unions are opposed to such action and will aid us in this fight.

"We shall also be faced with some sort of wage and hour legislation. No one knows what form this will take, but again we must be prepared to protect our interests, and there is no way except through our Association.

"There will be juggling of the so-called Anti-Trust Laws, the intention being to make them more severe. What should be done is to liberalize these laws and to clarify them so people may interpret them. There is no danger of a monopoly in this country. A monopoly is a racket and any racket which is productive of profit cannot long exist without competition and when there is competition, there is no monopoly. With the technical and managerial brains and money available today, there is no danger of monopoly. Some smart person will duplicate any profitable effort. Again counsel and the Committee on Public Affairs must be alert to protect our interests.

"Laws dealing with labor requirements on government contracts such as the Walsh-Healey Act may be amended and made more stringent. Laws relating to sales activities such as the Robinson-Patman Act will bob up to confuse us. Stream pollution legislation is bound to be forthcoming. All these and probably hosts of others will be hanging over us. Many of these will become the new rules and the new agencies just as the Wagner Act with its National Labor Relations Board has become a part of our business regulation. We do not have time to study these proposed laws and if they are passed we do not have time to analyze them and to find out what we are required to do to conform to them. Again our Association is our opposing factor to proposed unfavorable legislation and our interpreter when enacted.

"I think few people realize how much work is done by the staff and by Committees to head off things which might have had effect on our business. It is difficult to explain to people why so much effort may be put on nebulous proposals which are made by government or other agencies, but we have felt that if these are killed in the incipient stage, we save a great deal more effort and expense.

Association Needs Support

"I wish to thank all those who have given so liberally of time and expense in trying to make our Association work effective. The Chairmen of the several committees and particularly the Chairmen of the Finance Committee and the Public Affairs Committee, are to be commended for the good work they have done for us.

"I wish to again stress the necessity for adequate support of this Association. We are in an 'experimental age.' Things move faster than ever before. We must have information about our business and have it promptly. These extraneous things may affect our business to a certain degree but the good old fundamental facts are still the things to guide us in shaping our policy for the future. The more complete the data the better chance of charting a safe course. All of the divisional associations need your support. This is no time to trim sail on association work. Given the proper tools with which to work, I am confident that with the intelligence we have in this industry, we will be able to keep pace with other industries and retain our place in the national picture.

"I am not a prophet and usually when one presumes to make predictions he gets into trouble but I honestly feel that consumption of paper during 1938 will finally wind up in a position midway between 1936 and 1937."

Committee reports were rendered, and chairmen of the various divisions of the A.P.P.A. spoke on conditions existing in their different branches of the industry, citing statistics to show the present scope of manufacturing operations and figures giving a picture of operations during the last calendar year. It was brought out that practically all branches of the industry are now better occupied than during the depths of the recession in November and December.

Social features of the convention included the annual luncheon of the Salesmen's Association of the Paper Industry in the Grand Ballroom of the Waldorf-Astoria on Tuesday, at which all previous records of attendance were broken; the Technical Association's yearly luncheon on Wednesday in the hotel's Grand Ballroom; the Paper and Twine Club dinner party Wednesday night on the hotel's Starlight Roof, the National Paper Trade Association's frolic at the Casa Manana Monday evening, and luncheons of various of the individual association groups.

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◆ Safety Committee Plans Silver Jubilee Meet

Eleven members of the Executive Committee of the Paper and Pulp Section of the National Safety Council met recently at the Council offices in Chicago. Reports of the program, News Letter, publicity and contest committees were given.

A tentative program for the 1938 Silver Jubilee National Safety Congress, to be held in Chicago October 10-14, was drawn up. This will be submitted to the individual members for criticism and the final program will be made at the spring meeting of the Executive session in New York.

A committee composed of F. W. Braun, A. Scott Dowd, and Clayton Braatz was appointed to promote closer co-operation between the Section and the American Paper and Pulp Association.

Twenty-third Annual Meeting of the Technical Association

THE twenty-third annual convention of the Technical Association of the Pulp and Paper Industry was held February 21 to 24, 1938 inclusive, at the Waldorf-Astoria Hotel in New York, N. Y.

A general session, over which G. N. Collins, retiring president of TAPPI, presided as chairman, opened the convention. The program of this session included the presentation of the Report of the Secretary, the Presidential Address, Special Committee Reports, Progress Reports and four papers, one of which was presented by title. Announcement also was made during the session as to the election of officers, the election being conducted for the first time in the history of the Association by letter ballot.

Secretary Macdonald Reports for year

R. G. Macdonald, Secretary of the Association, in presenting his report, stated, in part, that the Association, during 1937, made considerable progress particularly in committee work and in national and local section meeting programs; that total membership of the Association on December 31, 1937 was 1,521, a new high record; that, during the year, Crossett Paper Mills Co., Claremont Paper Co., Southern Advance Bag and Paper Co., Mohawk Paper Mills, Inland Empire Paper Co., Chesapeake Corporation, Ontonagon Fibre Co., Paterson Parchment Co., Champion Paper and Fibre Co. and Papeteries de Belgique became corporate members, while Columbia Alkali Co., Appleton Wire Works, International Filter Co., Geigy Co., Goulds Pumps, Inc., Wm. H. Hooper & Sons Co., Foster-Wheeler Co., Johaneson, Wales & Sparre, Magnus Chemical Co., Bulkley, Dunton & Co., Bailey Meter Co., Arundel Corp. and Hermann Manufacturing Co. were added to the list of contributing members; that two corporate members resigned during the year; that five members (W. T. Snyder, W. L. Wisard, J. A. Yates, L. M. Smith and J. M. Hibbs) passed on during the year; that a special report was issued during the year on each of the following subjects: Blackening of Paper, Paperboard Surfacing for Lithographing, Wire Cloth Requirements for Pulp Washers, Fuzz on Wire Side of Coating Stock, Hair Cuts from Wool on M. G. Waxing Sheet, Eliminating Fuzz in Mimeo Paper, Sizing 100 Per Cent Rag Paper, Wetting Down Wood Piles, and Casein Coated Paper for Offset; that the Association, serving throughout the year as a clearing house for employment of members, helped a large number to become satisfactorily located in the paper and allied industries; that the success of the fall meeting, held at the De Soto Hotel, Savannah, Ga., on October 18 to 21, 1937 was due largely to the efforts of D. G. Moon, General Chairman, and his associates in Savannah; that a number of proposed changes in the Articles of Organization were approved at the Savannah meeting and by mail ballot were later adopted; that a seminar on qualitative microanalysis was held from June 21 to July 1, 1937 at the Institute of Paper Chemistry for the benefit of members of the Technical Association employed by corporate members; that an appropriation of $1,000 was made to finance a project of the Fundamental Research Committee on The Existence and Nature of Fiber Membranes and one of $600 for a study of "Holocellulose" for the benefit of the Fibrous Material Testing Committee; that the papers presented at the fall and annual meetings were published in Technical Association Papers in June, the Lockwood Trade Journal contributing financially and through the editorial assistance of Henry J. Berger to their preparation; that the Annual Bibliography for 1936, the first of an annual series, was published in March; that about 1,600 copies of TAPPI Standards have been distributed, that the third edition of Volume III of *The Manufacture of Pulp and Paper* was published during the year by McGraw-Hill Publishing Company; that Volumes IV and V are due in 1938; that the Executive Committee approved the application for a local section charter by members in Northern New York and that the charter will be issued at the next meeting of the organization which is to be known as The Empire State Section of TAPPI; that a number of personnel changes were made during the year in various division and committee chairmanships—B. M. Thomas of Container Corporation of America and H. P. Cannon of the Upson Company succeeding W. M. Shoemaker of National Vulcanized Fibre and Paul Koenig of the P. H. Glatfelter Co. as general chairman and vice chairman respectively of the Management Division—W. G. MacNaughton of the News Print Service Bureau succeeding H. M. Teaze of Hardy S. Ferguson as general chairman of the Engineering Division—F. M. Wilmer of Halifax Paper Co. succeeding Frederick Wierk of Johnson & Wierk as chairman of the Equipment Committee—A. E. Montgomery of J. O. Ross Engineering Co. succeeding A. G. Darling of the General Electric Company as chairman of the Heat and Power Committee—James A. Lee of Chemical and Metallurgical Engineering succeeding James D. Miller of the Southern Kraft Corporation as chairman of the Materials of Construction Committee—Charles S. Taylor of Riegel Paper Corporation succeeding James A. Lee as chairman of the Non-Fibrous Raw Materials Committee (Raw Materials Division)—A. B. Clark of Racquette River Paper Company succeeding N. F. Waters of the Champion Paper and Fibre Co. as chairman of the Paper Finishing Committee (Operation Division)—J. D. Malcolmson of Robert Gair Co. succeeding Pierre Drowsen of Hinde & Dauch Paper Co. as chairman of the Containers Committee (Converting and Consuming Division)—C. E. Hrubesky of U. S. Forest Products Laboratory succeeding M. A. Youtz of the Drackett Co. as chairman of the Fibrous Material Testing Committee (Testing Division); and that the name of the Color Committee, one of the special committees, was changed to the Optical Properties Committee, John L. Parsons of Hammermill Paper Co. being chairman.

The President's Address

Highlighting the Presidential Address, Grellet N. Collins said that the war situation in Spain and China has stimulated the demand for cellulose; that the European situation among the different nations has made them conscious of their dependence on other countries for a supply of cellulose for a necessary war material; that processes for reclaiming waste paper are being improved by the further use of wetting agents and detergents; that the pulp supply will be further supplemented by development of the use of waste farm and agricultural products; that developments of the pulping processes are progressing; that progressive companies have continued to develop their by-products from some of the waste materials which have been a nuisance to the industry in the past; that the quality and color of domestic clay used by the papermaker has been improved tremendously and now equals or surpasses the finest grades of imported clay; that an additional domestic source of titanium dioxide came into production within the last year; that other new pigments and fillers are being offered; that the demand for coated papers, especially on a groundwood base, has progressed and very satisfactory results have been attained; that the latest coating development is the production of a coated surface which is made so smooth on the coating machine that it needs no calendering; that there are some new types of coatings, one of which contains no pigment and produces a beautiful high white finish without calendering; that substantial strides have been made in several units for preparing the fibers which produce pulp of desirable quality at a saving in power; that numerous developments and refinements have been made to improve paper machines; that new metals and alloys have played a part in improving machinery; that estimated production figures for 1937 exceed 1936 figures by 9.4 per cent for printing papers (excluding coated), 2.8 per cent for writing and cover, 10.0 per cent for wrapping, 17.9 per cent for all

boards, 10.0 per cent for tissue and miscellaneous, and 3.0 per cent for newsprint; and that statistics for imports bring out possibilities for further expansion in the industry if the United States is to be more self-contained.

In referring to the activities of the Technical Association during the past year, Mr. Collins likewise mentioned that one of the textbooks was revised in 1937; that two more are due to be revised and published in 1938; that a reciprocal arrangement has been worked out with the Canadian Technical Section whereby useful information gathered by the latter and published for its members in the form of loose-leaf engineering data sheets can be published by TAPPI; that it is one of the ambitions of TAPPI eventually to collect sufficient data and summarize it so that it could be published in the form of a handbook similar to some of the engineering handbooks now available; and that nine Special Reports were issued in 1937.

Mr. Collins, in citing committee activities, thanked the various committee members for their good work. He also thanked various government agencies for their co-operation, mentioning specifically the U. S. Forest Products Laboratory, Madison, Wisconsin, and the National Bureau of Standards, Washington, D. C.

Attention likewise was called by Mr. Collins to the Bibliography published during the year as an annual bound volume; to the issuance of ten more TAPPI Standards; to the record fall meeting (1937) in Savannah, Ga.; to the individual membership in the Association of over 1,500; and to the excellent financial position of the Association, it being stated that it is the strongest it has ever been.

Mr. Collins concluded his address by stating that there is a greater opportunity for the technical man in the pulp and paper industry than ever before.

Special Committee Reports

Among the various Special Committee Reports and Progress Reports there were two reports by B. W. Scribner, Chief, Paper Section, National Bureau of Standards and Chairman of TAPPI Paper Testing Committee, one entitled, *Developments in Paper Testing During 1936-'37*, the other, *Annual Progress Report of Paper Testing Committee, TAPPI 1937-1938.*

Paper Testing

The first of these two reports mentioned the more important developments in paper testing which had been noted to October, 1937, in the literature over a period of about one year. Broadly, the report touched upon general physical properties, optical properties, microscopy, chemical properties, properties of specific products, and other facts of related interest. It included a bibliography covering 107 literature references.

The second report by Mr. Scribner called attention to the appointment of L. S. Reid, Metropolitan Life Insurance Co., as chairman of the Subcommittee on Microscopic Testing and of R. W. McKinley as chairman of the Subcommittee on Physical Testing. It also revealed that the Paper Testing Committee now comprises 19 members and that cooperating with them are 38 additional members of subcommittees, making a total of 57 engaged in the development work.

It likewise was brought out in the report that the method of Cobb and Lowe for testing the water absorptiveness of non-bibulous papers and paperboards was completed by P. W. Codwise's subcommittee and has been adopted as a tentative standard; that a revision of the present method for water resistance is being written to include the ground-glass test for water resistance of water-proofed papers, as an official method; that the proposed methods for printing smoothness and printing ink permeation have been referred back to R. H. Simmons' subcommittee for further investigation, which is in progress; that a bibliography of *Microscopy of Paper* by J. B. Calkin, formerly Chairman of the Committee on Microscopic Testing, was published in booklet form; that under the direction of the present chairman, the subcommittee completed a revision of the method for fiber composition of paper, and a suggested method for identification of specks and spots; that the further program comprises study of proposed weight factors to find whether they are valid for fibers as they occur in paper, fiber length, and round-robin tests of the Graff "C" stain; that R. W. McKinley, Chairman of the Subcommittee on Physical Testing, prepared another proposed revision of the method for tensile breaking strength and this is being considered by members of the subcommittee; that a method and apparatus developed by C. G. Weber and M. N. V. Geib for measurement of relative hygrometric expansivity of paper is being used as a basis for a proposed TAPPI method; that considerable progress was made by the Subcommittee on Chemical Methods of which P. F. Wehmer is Chairman—a revised method for the determination of starch, another for the determination of reducible sulphur, and a method for silver staining determination being completed and now being acted upon by the Standards Committee; that R. C. Griffin and Mr. Scribner collaborated in preparation of revisions of methods for copper number, mineral coating, mineral filler, ash and total acidity; that improved procedures for alpha, beta, and gamma cellulose, pentosans, and pH have been developed by H. F. Launer, and will be forwarded for subcommittee investigation in near future; that the total number of TAPPI paper testing methods is now 41; that seven revisions and one new method were completed for the consideration of the Standards Committee; that there are 21 projects actively in progress; that the Chairman of the Committee with the collaboration of F. T. Carson, completed a revision of the paper testing section of Vol. V of the TAPPI textbooks, *Manufacture of Pulp and Paper;* and that contact with the American Society for Testing Materials developments in paper testing has been maintained, and improved co-ordination of the work of the TAPPI Paper Testing Committee and that of the Paper Testing Committee of the Technical Section, Paper Makers' Association of Great Britain and Ireland has been established.

Waste Committee

One of the other reports, the report of Waste Committee, of which C. M. Baker is Chairman, covered proposed tentative standards on Flow Measurements of Mill Wastes. Five methods of measuring flows were listed in order of usual preference—weirs, Venturi flumes, submerged weirs, orifice, and water meters; and pertinent information presented on the first four of them. The report revealed that sharp crest double-end contracted and straight-side rectangular and V-notched weirs constitute the simplest and probably the most satisfactory method of measuring flows; that Venturi flumes have the advantage of requiring a low head to operate and, because of smooth flow along the bottom, there is less tendency for accumulation of debris back of weir; that submerged weirs serve the same purpose as Venturi flumes, have substantially the same advantages, and are easier to construct; that a circular orifice in a metal plate slipped in between the flanges of pipes constitutes an easy method for making a meter installation but accumulation of air or debris in a pipe line may interfere with its use; and that standard water meters often do not operate satisfactorily with mill wastes because of the debris contained in them (the Venturi meter probably being the most satisfactory).

Patents Committee

Technological Trends and National Policy was the title of the annual development report of the TAPPI Patents Committee. This report, presented by C. W. Rivise, Chairman, exhibited that the most outstanding event of the year in the realm of patents and inventions was the publication of a 450,000-word report on Technological Trends and National Policy by the National Resources Committee (Subcommittee on Technology). The report by Mr. Rivise briefly summarized the findings and the recommendations contained in this work. One of the studies, listed in the recommendations, which should be undertaken on inventions, covered artificial cotton and woolen-like fibre made from cellulose. Reference also was made by Mr. Rivise to the annual report of the Commissioner of Patents for the fiscal year ending June 30 1937, in which it is revealed that there was a continued and steady growth in volume of business of the Patent Office throughout the year; that the receipts of the Patent Office reached an all-time high, namely: $4 565,501.69; that reclassification of patents was greatly accelerated; and that the number of long-pending applications was considerably reduced.

Container Committee

Two other reports included that of the Container Committee, of which J. D. Malcolmson, Technical Director, Robert Gair Co., is Chairman, and that of the Standards Committee, of which R. C. Griffin,

of Arthur D. Little, Inc., is the Chairman.

The first of these two reports, a report entitled, Container Testing Standards, revealed that the Container Committee is giving consideration to the development of testing methods that will be applicable to fiber container boards and described the methods that are currently being considered for adoption as TAPPI tentative standards. These methods included bursting strength of combined corrugated container board, bursting strength of container grades of paperboards and built-up solid fibre containers (not corrugated containers), thickness of container grades of paperboard and built-up fibreboard for containers, conditioning of container grades of paperboard and of solid fibre and corrugated containers for testing, and basis weight of container grades of paperboards and built-up solid fiber and corrugated container boards.

Report on Standards

In the report of the Standards Committee, Mr. Griffin stated that during the past year, four standards, namely: Alkaline Pulping Thermal Code, Standard Terms Used in the Soda Pulping Process, Zinc Pigments in Paper, and Titanium Pigments in Paper, were advanced from tentative to official; that the tentative standard on Forming and Testing Pulp Sheets, although recommended for advancement to official by the Pulp Testing Committee, is being continued as tentative; that three new tentative standards, namely: Permanganate Number of Pulp, Alkali-Staining Property of Paper, Water Absorptiveness of Non-Bibulous Papers and Paper Boards, were approved and published; that two new suggested methods covering Analysis of Sulphite Waste Liquor and Species Identification of Wood and Wood Fibers were approved and have been published for the Manual; that corrected standards have been published on Isolation of Cellulose by Chlorination Method, Tearing Strength of Paper, Preparation and Standardization of Volumetric Solutions, Analysis of Alum, and Analysis of Mineral Fillers; that revisions of the standards on Copper Number of Paper, Ash in Paper, and Mineral Coating of Paper have been approved but not yet published; and that a revised method for Fiber Composition of Paper, under consideration for about two years, will appear in the near future. Mr. Griffin likewise recommended that officers and Committee Chairmen of TAPPI do all in their power to foster and promote the continuation of the cordial and close relationship of TAPPI and ASTM.

Officers Elected

The announcement of the election of officers revealed the following selection:

President—Frederic C. Clark, Mill Manager, Paper Mill Division, Pond's Extract Co., Seymour, Conn.

Vice President—Harold R. Murdock, Director, Research Department, Champion Paper & Fiber Co., Canton, N. C.

Executive Committee (1 year)—Frank D. Libby, Assistant Manager, Kalamazoo Vegetable Parchment Co., Parchment, Mich.

Executive Committee (2 years)—George D. Bearce, Manager, Maine Seaboard Paper Co., Buckport, Me.

Albert Bankus, Vice President, Crown-Zellerbach Corporation and Crown-Willamette Paper Co., San Francisco, Calif.

Executive Committee (3 years)—Lorne C. Anderson, Manager of Manufacturing, Ontario Paper Co., Thorold, Ont.

G. S. Brazeau, Manager, Everett Mill, Weyerhaeuser Timber Co., Everett, Wash.

G. W. E. Nicholson, Manager, Southern Kraft Corporation, Panama City, Fla., and Georgetown, S. C.

B. M. Thomas, Mill Manager, Container Corporation of America, (Manayunk) Philadelphia, Pa.

Papers Presented on Morning of First Day

The four papers on the program of the general session on the morning of the first day of the convention included:

FREDERIC C. CLARK
New TAPPI President

The Existence and Nature of Fiber Membranes, by Dr. H. F. Lewis, Institute of Paper Chemistry, Appleton, Wisconsin; Degree of Gelatinization of Cellulose and Wood, by Dr. E. C. Jahn, University of Idaho; Economic and Technical Aspects of Wood Pulp as a World Commodity, by R. B. Wolf, vice president and general manager, Pulp Division, Weyerhaeuser Timber Company, Longview, Washington; and Two and One-Half Centuries of American Paper Making, by W. B. Wheelwright, editor and publisher, *Paper and Printing Digest*, Chicago, Illinois.

Determining the Degree of Gelatinization

Dr. Jahn, in his paper on *Degree of Gelatinization of Cellulose and Wood*, stated that the presentation was in the form of a progress report of work done at the School of Forestry, University of Idaho, under the sponsorship of a TAPPI fundamental research grant; and that most of the research work was done by Arthur Sedoff, of M.I.T., who was appointed TAPPI Research Fellow.

When cellulose or wood is comminuted over a sufficiently long time, or by drastic means, continued Dr. Jahn, the grosser structure is broken down and a slimy gel is ultimately formed. He added that, in connection with research on the molding of hard, strong materials from comminuted wood, it was desirable to obtain a measure of the degree of comminution or of gelatinization; that observation of wet cakes of beaten material, when pressed under high pressure under certain definite conditions, showed an apparent relationship between the per cent water retained by the cellulosic cake and the degree of gelatinization or beating; and that, for drastically beaten material, this relationship seemed to be the basis of a workable test.

It was the purpose of the work involved in the present study, commented Dr. Jahn, to investigate this factor critically in order to determine its definite values and relationship to stuff properties, and to determine its relation to change occurring upon beating in normal mill practice and to sheet properties. The per cent of water retained under various conditions was determined for wood (sawdust) and for bleached sulphate pulp which had been beaten in various media and for various periods of time in a stainless steel rod mill. It was found that the effect of increasing the pressure on the test cake from two to fifteen tons affected the water retained, but not a great deal; that best differentiation and accuracy was obtained at two tons per square inch pressure for ten minutes; that consistent differences may be measured in the per cent water retained by cakes of differently beaten pulps when pressed under certain standardized conditions; that the degree of gelatinization correlated with the per cent linear shrinkage on drying; and that diameter measurement of a wet pulp cake, taken immediately upon releasing pressure, was smaller than the mold diameter; that this "elastic contraction" was large for unbeaten pulp and very small after beating one hour.

Dr. Jahn, in concluding his paper, stated that the work indicates that the per cent water retained under pressure varies with the structural and physical differences in the pulp mat brought about by beating; that beating inhibits the flow of water from the pulp mats under the conditions used; that it appears that a graphic and mathematical expression of the effects of such fiber properties as rigidity and particle size and shape might be determined in relation to water retention by a further study of this factor and of shrinkage and density; that, since the degree of gelatinization depends upon the physical properties of the stuff, and, since these values correlate with shrinkage, the test, depending upon certain inherent properties of the pulp, should be of practical value; and that work is in progress to improve the technique and accuracy of measuring water retained,

and to correlate the values with other recognized pulp property indices and to study the effect of fiber properties on water retention.

Wood Pulp—as a World Commodity

Mr. Wolf, in his paper on *Economic and Technical Aspects of Wood Pulp as a World Commodity*, related the experiences and accomplishments of O. M. Porter, Secretary of U. S. Pulp Producers Association, and himself on a joint trip last summer to Europe, mentioning that many contacts were made during the trip; that everywhere they went, they were pleasantly received; and that, as a result of the trip, a monthly exchange of information between the U. S. Pulp Producers Association and all of the principal pulp producing countries of Europe was arranged. The United States, continued Mr. Wolf, is the largest pulp producer, pulp consumer, and pulp importer in the world. He recommended that managers and technicians in the industry on this side of the Atlantic go abroad more frequently, stating that there is much of interest to see in Norway, Sweden and Germany. In concluding his remarks, Mr. Wolf called attention to TAPPI of its real responsibility in applying the technical and scientific approach to the economics of the industry, and quoted directly from "Man—The Unknown," by Dr. Alexis Carrel, to lend emphasis to his point of view.

American Paper Making History

The paper on *Two and One-Half Centuries of American Paper Making*, by W. B. Wheelwright, was presented by title. In this paper, Mr. Wheelwright reviewed briefly some of the early history of the papermaking industry in this country, and pleaded for a recognition of the industry's landmarks. He made reference to two existing markers, one a small tablet inconspicuously placed near the site of New England's first paper mill at Milton, Mass., and the other a bronze plaque in Stockbridge, Mass., near the Interlaken Post Office, formerly known as Curtisville, commemorating the erection of the first groundwood pulp mill in the United States; and cited a few other names and places deserving of markers. In these citations was mentioned the Gilpin mill, near Wilmington, Delaware, in which the first American-made cylinder machine was installed in 1816; the firm of D. and J. Ames at Springfield, Mass., John Ames of this firm having built a cylinder paper machine in 1822; the installation of the first fourdrinier machine in this country at Saugerties, New York; the building of the first American-made fourdrinier by Phelps Spafford in 1829; the weaving of the first American-made wire by William Staniar in 1847 at Belleville, New Jersey; the making of the first endless felts in 1864 at Camden, Maine; the invention of the sulphite process by Benjamin Tilghmann; the first commercial production of sulphite pulp in this country in 1882 at East Providence, Rhode Island; the first making of sulphate pulp in the United States at Muskegon, Michigan; and the first use of southern pine for sulphate pulp in 1911 at Orange, Texas. Mr. Wheelwright further called attention to the opportunity of assembling a comprehensive permanent exhibit of paper and papermaking at the Museum of Science and Industry in Chicago, and concluded his remarks with two recommendations to TAPPI, as a contribution from its History and Biography Committee, namely; one, the erection of suitable markers at important historical sites of papermaking, and the other, to take action looking toward the creation of a permanent visualization of the industry in the Museum of Science and Industry.

Group Meetings Held Afternoon of First Day

Two group meetings occupied the program of the afternoon of the first day of the convention. One of these meetings was on Fundamental Research, with Dr. C. E. Curran of the U. S. Forest Products Laboratory, Madison, Wisconsin, and Dr. H. F. Lewis of the Institute of Paper Chemistry, Appleton, Wisconsin, as chairmen. The other meeting, on Containers, was presided over by A. W. Nickerson, engineer, and J. D. Malcolmson, Director, Research Department, Robert Gair Company.

Fundamental Research

Six papers were scheduled for presentation before the meeting on Fundamental Research, one of them being by title.

Reflectance Method for Studying Discoloration

A Reflectance Method for the Study of the Discoloration of Artificially Aged Papers, by J. C. Tongren, Hammermill Paper Company, Erie, Pa., was the subject of the first paper. This paper, consisting of a portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the Degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1937, included a historical survey of the subject, a description of experimental methods, a discussion of experimental results, a summary and a bibliography. The bibliography consisted of twenty-five literature citations, twenty of which were referred to in the historical survey.

The experimental methods, in brief, were as follows: All sized sheets were made on Williams sheet-making equipment; sheets were made to correspond to a basis weight of twenty pounds for a ream size of seventeen inches by twenty-two inches, 500; abietic acid for sizing was prepared from commercial G gum rosin; alum for fixing the size was applied in the form of a three per cent solution of chemically pure aluminum sulphate in distilled water; paper samples were suspended near the top of a well-insulated electric oven in which temperatures were controlled within 1 to 1.5 deg. C.; and reflectivity values of papers were determined by means of a General Electric reflection meter.

Experimental results revealed that, when a commercial sulphite pulp was made into handsheets containing approximately 0.9 per cent of a common grade rosin, the reflectivity, or brightness, of the pulp fell quite generally from eighty to seventy-five; that, when oven aged for increasing intervals at 110 deg. C., both unsized and sized sheets suffered loss in reflectivity by almost equal increments (after forty-eight hours of aging, the respective reflectivities were seventy and sixty-five); that sized sheets were found to discolor half again as rapidly as unsized sheets; that, when a series of sheets containing increasing amounts of rosin was aged, the log-log relation of the aging rates and the rosin contents proved to be a straight line; that discoloration rates for sulphite sheets, made from a commercial pulp, and bleached to various degrees of whiteness, appear to be roughly independent of the degree of bleaching; that removal of a portion of the natural resin from a sulphite pulp by alcohol extraction tends to lower the discoloration rate; that purification of a sulphite pulp by removing the bleach residues with caustic soda results in a significant decrease in rate of discoloration (a pulp purified in this way discoloring only 25 per cent as fast as original pulp); that, at 25 per cent relative humidity and above, the rate of discoloration upon aging increases linearly with the relative humidity of the aging atmosphere at 100 deg. C.; and that the more rapid aging rates at the higher relative humidities are accompanied by an increase in the copper number.

Multi-Purpose Reflectometer

The subject of the second paper on the program of the Fundamental Research meeting, scheduled for presentation by title, was *A Photoelectric Multi-Purpose Reflectometer*. Its author was R. S. Hunter.

Chlorinated Lignin —Its Solubility

The next paper, a paper entitled *Solubility of Chlorinated Lignin in Alkaline Solutions*, was a joint contribution of G. C. Arnold, F. A. Simmonds and C. E. Curran, members of the staff of the U. S. Forest Products Laboratory, Madison, Wis.

In this paper, five alkalies in aqueous solution, namely, sodium, calcium, and ammonium hydroxides, sodium carbonate, and sodium metasilicate were compared quantitatively as to their efficiency for dissolving chlorinated lignin obtained from wood, sulphate black liquor, and sulphate pulp.

Of these alkalis, sodium hydroxide was the most and calcium hydroxide was the least efficient. The other three were approximately equal and intermediate to the others.

Calcium hydroxide apparently forms a relatively insoluble complex with chlorinated lignin as indicated by the precipi-

tation resulting upon the addition of calcium hydroxide to a concentrated solution of chlorinated lignin in sodium hydroxide.

An alkaline extraction of washed, chlorinated pulp removes a fraction of chlorinated lignin that is insoluble in cold water and in hot ethyl alcohol. Even the water-soluble fraction is not completely removable with economically feasible washing practices.

A greater degree of solution of chlorinated lignin from wood was effected by a sodium hydroxide solution at 25 deg. than at 60 deg. C. and its solution in calcium hydroxide solution is just the reverse of this. Chlorinated lignin from sulphate pulp, however, is more soluble in sodium hydroxide solution at 60 deg. than at 25 deg. C.

The Effect of Digestion

Effect of Digestion on Wood Structure was the subject of the succeeding paper. It was the contribution of A. L. M. Bixler, Riegel Paper Corp., Riegelsville, N. J., and consisted of a portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1937.

In the study upon which this paper was based, thin cross sections (20 microns thick) of spruce were digested in sulphite, soda, and kraft cooking liquors of approximate commercial strengths and at temperatures of 150, 175, and 175 deg. C. respectively and then photomicrographs made of the digested sections. The study revealed that the sulphite, soda and kraft digestions attacked the intercellular material of the wood and completely removed or gelatinized it. That the sulphite, soda and kraft digestions attacked the secondary walls and removed or gelatinized a considerable portion of the outer layer of these walls, especially on the radial ends, and caused the cambial walls to stand out from them; that the sulphite, soda and kraft digestions did not materially attack the cambial walls (these persisted throughout most prolonged digestions and completely encased the secondary walls in the digested sections); that kraft and soda digestions had a semi-selective action on the wood (attack on intercellular material was nearly complete before any very great visible attack was made on secondary wall); that sulphite digestion did not show this selective action (attack on intercellular material and secondary walls proceeded very nearly simultaneously); and that swelling action in sulphuric acid of the cross-sections of spruce digested in sulphite soda, and kraft liquors indicated that sulphite digestion had a more drastic effect on both the cambial and secondary walls than did either the soda or kraft digestions.

It likewise was pointed out in this paper that there is believed to be some evidence to indicate that digestion did not completely remove the intercellular material and the outer layer of the secondary walls from the cross sections, but that it was partially dissolved with the effect of delignification, and that the undissolved part remained in place as a transparent and apparently gelatinous material; that Kerr and Bailey's picture of mature wood structure, in general, was verified—the intercellular material was mostly lignin, and amorphous and isotropic—the cambial cells were mostly cellulose and were birefringent in cross section—the secondary walls consisted of two parts, the outer part mostly lignin, and the inner portion, comprising most of the secondary wall, mainly cellulose and isotropic in cross section; that pulp fibers produced from

GRELLET N. COLLINS
Retiring President

spruce by digestion with sulphite, soda, or kraft liquors consists of two morphologically distinct walls (cambial and secondary), which differ in some of their physical properties; that the cause of constructions in ballooning fibers of spruce has been definitely associated with the cambial walls and, whether or not the cross elements of Lüdtke exist, they are not necessary to explain satisfactorily the balloon swelling of spruce wood fibers; and that the actions of calcium hypochlorite and chlorine followed by a sodium hydroxide wash had a similar visual effect on both digested and undigested cross sections, and closely paralleled the effects of digestion but were a little more specific in that, though they almost completely delignified the sections, they had a somewhat less apparent visible attack on the secondary walls.

Water Vapor Sorption

The fifth paper on the program of the Fundamental Research meeting, a paper entitled *Sorption of Water Vapor by Papermaking Materials*, was presented by C. O. Seborg as a joint paper by F. A. Simmonds, P. K. Baird and himself, Associate Chemist, Senior Chemist and Assistant Chemist respectively, U. S. Forest Products Laboratory, Madison, Wisconsin.

It described some of the phases of fundamental research on the moisture relations of papermaking materials carried on in the Laboratory of the Institute.

The apparatus for making the moisture content determinations over a wide range of humidities involved the use of sensitive quartz spirals for weight measurements, and various saturated salt solutions for maintaining the desired relative humidities at atmospheric pressure.

The effect of beating, bleaching and drying on the hygroscopicity of kraft and sulphite pulps were discussed and a study of the hysteresis effect was included.

Extreme beating was found to increase the equilibrium moisture content of a pulp over the entire range of humidities, the increase amounting to approximately 6 percent when based on the moisture content of the unbeaten pulp.

Bleaching reduced the hygroscopicity, the reduction depending upon the severity of bleaching.

The magnitude of sorption hysteresis remained unchanged during the course of repeated sorption cycles. The ratio of adsorption moisture content to desorption moisture content over a wide range of humidity was found to be a constant unaffected by beating, bleaching, cooking process or species of wood.

Drying produced an irreversible loss of desorption hygroscopicity above 50 percent relative humidity which was independent of the effect of bleaching. Repeated drying and soaking treatments produced a further reduction in hygroscopicity at decreasing increments until the pulp had been dried six times after which no further reduction occurred. The adsorption moisture relations appeared independent of the effects of drying observed on desorption.

Photographing Fibers in Suspension

Photographic Study of the Motion of Fibers and Water in Flowing Fiber Suspensions was the subject of the last paper to be presented before the Fundamental Research meeting. This paper, consisting of a portion of thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1937, was the joint contribution of Earl O. Bryant, Champagne Paper Co., New York, N. Y., and Lamar A. Moss, Gilbert Paper Co., Neenah, Wisconsin. It was presented by Dr. J. Van den Akker of the staff of The Institute of Paper Chemistry.

In making this study, pictures were taken by light transmitted horizontally and vertically through glass-walled models, so that silhouette images were obtained. Likewise, multiple exposures (usually triple) showing successive fiber images separated by a time interval of 1/120 sec. were made. Fiber orientation in free flow of stock was shown to be random but alignment began as soon as fibers entered zone of acceleration just back of, and under, the slice. In all cases studied, the acceleration action under the slice or through the inlet pulled out each individual fiber and lined it up in the machine direction. Fibers nearly perpen-

dicular to the direction of flow were not always acted upon, however.

Comparison of the velocity at the top and bottom of the stream from a vertical slice, especially one having a sharp edge facing the flow, showed an appreciably greater velocity at the top of the stream.

It was shown by comparison of velocities of large and small particles that in smooth flow the fibers move at the same speed as the stream and that even during acceleration there is little or no lag. Width of slice opening had no effect on velocity of stream or alignment of fibers with a constant head back of slice—indicating that volume of delivery was approximately proportional to width of opening. The alignment in the stream from the slice broke up gradually to become random again six inches from the slice.

Consistencies from 0.001 to 0.25 per cent were studied to show that the fiber aligning action of the acceleration under the slice was independent of consistency over this range. Pulp beaten to a freeness of 310 S.-R. exhibited the same phenomena as the unbeaten stock.

In a two-slice system, the stream from the first slice tended to flow underneath the pond directly to the second slice, but function with the pond caused strong turbulence which tended to break up the stream. The angular position of a sloping slice did not noticeably affect the alignment of fibers as seen in the side views. In the top views, however, the fiber alignment decreased as the slice was turned further from the vertical. A ridge in the apron cloth under a sloping slice had no effect on stream conditions.

Curved and roll-type inlets produced conditions similar to those with sloping slices but gave somewhat less alignment in top views. The stream over streamlined spillway of a dam-type inlet showed the usual aligning phenomena in the zone of acceleration, and the stream off the bottom still exhibited strong fiber alignment. Models of the Bell-Irving and Lund nozzle inlets showed a similar lining up of the fibers along streamlines in the zone of acceleration, and the fibers in the issuing streams were well oriented in the direction of flow.

Gough's proposed head box design was found to give recirculation which would tend to even up the flow, although the width of the trough used for the experiments was not sufficient to demonstrate this effect.

Container Group

Seven papers were scheduled for presentation before the group meeting on Containers.

Sanitary Standards for Paper Products

Reasonable Sanitary Standards for Paper Products, by J. R. Sanborn, New York Agricultural Experiment Station, Geneva, N. Y. was the first of them. Mr. Sanborn brought out in this paper that reasonable sanitary standards for food wrappers, food containers, paper drinking cups, and hospital cellulose are under consideration by public health authorities and purchasing departments; that bacteriological examination of paper and container board provides health laboratories with a means of determining the sanitary condition of these products and judging the probable sanitary state of mills that produce such paper; that studies of number and types of bacteria in pulp and paper show a close correlation with degrees of microbiological control established during manufacture; that effective microbiological control means adequate consistent purification of process water, general plant sanitation and cleanliness, utilization of non-contaminated high grade pulps and raw materials; employment of bacteria free water at calenders; effective use of bactericidal treatments; and strict methods of slime prevention.

Paper Requirements for Food Packaging

C. A. Southwick, Jr., Packaging Engineer, General Foods Corp., New York, N. Y. was scheduled for the presentation of the second paper before the Containers group meeting. His subject was *The Requirements of Paper for Food Packages.*

Mr. Southwick stated, in part, that the quantity of paper used by the food industry for packaging can be increased by the development of new materials and paper structures with improved functional characteristics; that the requirements for all food packages include physical protection of contents, protection against change of state, attractiveness or eye appeal, and convenience; that the final package is determined by such components or properties of foods as grease or fat content, aromatic or flavor ingredients, sensitivity to moisture gain or loss, and storage temperature requirements; that it is necessary in the packaging of foods, which contain a high fat content and which are to be given ordinary handling, to select a paper structure which in itself does not transmit fat, and then to form a container so that the fat cannot creep out at seams or closure; that the determining factors in the degree of moisture proofness required in a package are sensitivity of the product to moisture change, conditions of storage, and cost; that many food products which contain volatile fractions may not require moisture vapor proofness but simply the inclusion of papers which will retard the transmission of volatile portions; that paper for quick frozen foods requires the usual freedom of odors, plus high moisture-proofness and flexibility at low temperatures; that it is very necessary that a careful study be made before any recommendations are decided upon for a new food product or for revising the packing of a standard item; that proper evaluation of papers for food packages can be determined by laboratory testing; and that such tests will determine the odor and functional property of the paper structure.

Printing Characteristics of Boxboards

The third paper on the program of the Containers group meeting, a paper entitled *Printing Use Requirements of Boxboards* was the contribution of J. F. Halladay, Technical Superintendent, Container Corporation of America, Philadelphia, Pennsylvania.

A carton or container, said Mr. Halladay, must first have such physical characteristics as to protect and carry the contents intact to ultimate consumers. He added that the printed decoration of the carton has a profound effect on the initial attention and subsequent attitude of the consumer toward the enclosed product.

Offset, picking, fill-up, faulty trapping, and mottling of color were cited as several practical pressroom difficulties (involved with boxboard properties) which commonly block the effective discharge of the printer's obligation to decorate attractively, consistently, and efficiently. One of the most effective ways of dealing with offset, continued Mr. Halladay, is to introduce into the formulation of the ink a small percentage of light, odorless mineral oil. Another remedy, which is often effective, he said, is that of increasing the strength of the color, increasing the pressure on the form and decreasing the amount of ink delivered to the electrotypes.

Mr. Halladay likewise commented that the same remedies which are effective in eliminating offset are often effective in reducing or eliminating picking; that fill-up of halftone screens is usually caused by one of two conditions—incorrectly milled inks (not often responsible) and excessive ink on electrotypes; that faulty trapping is often caused by lack of smoothness necessitating excessive thickness of film of "first down" ink.

An hypothesis, based on constant association with pressroom operation and in a study of numerous literature references, was offered in an attempt to explain the relationship existing between variables inherent in the decoration of boxboards by means of the letterpress printing process. The basic facts involved in the hypothesis, added Mr. Halladay, have been applied to specifications for a period of two years and seem to have produced worthwhile economies.

Paper Board and Atmospheric Conditions

The succeeding paper on the Containers group meeting program also was by a member of the staff of the Container Corporation of America, Philadelphia, Pennsylvania. It was a paper entitled *The Influence of Atmospheric Humidity and Temperature on the Moisture Content of Paper Board;* and its contributor was R. W. K. Ulm. The paper consisted of a portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June 1937.

Mr. Ulm pointed out that an hysteresis exists in the moisture contents of paper boards at equilibrium with atmospheres of given relative humidities at all temperatures in the ordinary range—direc-

tion of approach to equilibrium condition (whether by absorption or by desorption) determining more than any other factor the moisture content at a given relative humidity; that in the higher range of relative humidities, the effect of temperature on the moisture content of board in equilibrium with an atmosphere of given relative humidity is relatively small (the moisture content passing through a minimum in the neighborhood of 70°F.); that in the lower range of relative humidities the effect of temperature is larger, the lower the relative humidity; that at the low humidity, the moisture content decreases linearly with increasing temperature; and that at a constant absolute humidity the moisture content at equilibrium decreases with increasing temperature.

It is apparent, therefore, stated Dr. Ulm, that, excluding the phenomenon of hysteresis, the moisture content of a piece of board is determined by fixing any two of the three variables—temperature, absolute humidity, and relative humidity.

A Testing Room

Conditioning Corrugated Boxes and Box Boards for Test Purposes by Harry L. Bode, Engineer, Gaylord Container Corporation, St. Louis, Missouri was the next paper scheduled on the Containers group meeting program. In this paper, Mr. Bode described a conditioning room (about 12 ft. x 6 ft. x 10 ft., insulated and moisture-proofed) designed to condition materials to a constant moisture content without direct control of temperature and relative humidity. Operation of the conditioning room centers around a floating switch which turns heaters and/or a humidifier on or off in response to change in weight of a control box (a folded corrugated box tied with string, the weight of which is known at the moisture content desired in the materials to be conditioned). The conditioning of the material is brought about in two steps, the first of which is a drying cycle, and the second a conditioning cycle. At the end of the drying period, about twelve hours in length, the materials have usually reached a moisture content of about 4.5 to 5 per cent. The conditioning cycle usually lasts for four hours and during this period the materials are impregnated with sufficient moisture to raise the moisture content from 4.5 - 5.0 per cent to 6.5 - 7.5 per cent for boxes or 6.0 - 7.0 for boxboards. Longer periods are required for higher moisture contents.

Mr. Bode added that this method of conditioning is relatively inexpensive to install, the conditioning cycle relatively short, and the degree of control quite gratifying.

Hinde & Dauch's Crush Tester

The sixth paper on the program of the Containers group meeting, a paper entitled *The Hinde & Dauch Paper Company Crush Tester*, was contributed by Pierre Drewsen, Chemical Engineer, The Hinde & Dauch Paper Company, Sandusky, Ohio.

The instrument described by Mr. Drewsen was developed in the Sandusky laboratory of the Hinde & Dauch Paper Company under Mr. Drewsen's direction. It was developed principally for testing straw corrugating paper and container liner board for stiffness, in the sense of ultimate breakdown strength. The idea adopted was to apply a vertical load on a sample resting on a steel bar and to measure the deflection of the bar at the breaking load. A bar was selected with dimensions such that a load of one pound would cause a deflection of 0.001 inch,

R. G. MACDONALD
Secretary-Treasurer

this deflection being measured by a gauge contacting the bottom of the bar. As soon as a breakage occurs, the bar tends to spring back into its normal position, but the indicated load on the dial remains unchanged, permitting the operator to read it at leisure.

The method used for adjusting the instrument was explained by Mr. Drewsen. He also mentioned the safety features of its design and suggested means of preparing test samples.

Testing Standards

The program of the Containers group meeting was concluded with a paper by J. D. Malcolmson on *Container Testing Standards*. This paper, a report of the TAPPI Container Committee, revealed a divergence of opinion in the container industry as to how certain specific tests should be carried out and exhibited details of present practice is testing bursting strength of combined corrugated container board, bursting strength of container grades of paperboards and built-up solid fibre containers (not corrugated containers), thickness of container grades of paperboard and built-up fibreboard for containers, conditioning of container grades of paperboard and of solid fibre and corrugating containers for testing, and basis weight of container grades of paperboards and built-up solid fibre and corrugated container boards.

Four Group Meetings on Second Day

The program of the second day of the convention consisted of four group meetings, two in the morning and two in the afternoon.

One of the morning sessions was on Stuff Preparation; the other on Bleaching. Frederic C. Clark and G. Lamont Bidwell were scheduled as Chairmen of the Stuff Preparation meeting; while Dr. H. C. Schwalbe and C. M. Connor were listed as Chairmen of the meeting on Bleaching.

Stuff Preparation and Management (Second)

The afternoon sessions included a second meeting on Stuff Preparation and a meeting on Management. The program listed G. Lamont Bidwell as Chairman of the meeting on Stuff Preparation, and B. M. Thomas and L. T. Stevenson as Chairmen of the Management meeting.

Control in the Beater Room

The first of three papers presented before the morning session on Stuff Preparation was on the subject of *Beater Room Control*. This paper, by W. F. Hoffman, Northwest Paper Co., Cloquet, Minnesota, described a beater room control system in a hypothetical mill. This mill made all of the pulp used by it, the pulp being delivered to the beater room in slush form or in laps or both. The pulp included unbleached sulphite, bleached sulphite, soda or sulphate, unbleached kraft, bleached kraft and stock from a paper stock plant.

Mr. Hoffman commented that, although the pulp mill has graded the pulp as to color before it comes to the beater room, brightness tests are taken on the stock in the pulp decker chests every two or three hours; that this procedure enables the beater engineers to hold their color much more uniform; that a General Electric reflection meter is used for the measurement of brightness; that a consisteney determination is made of the stock in the decker chest so that volume of stock required for any desired amount for a beater furnish can be calculated; that the consisteney of a pulp slurry can be determined quickly and sufficiently accurately by means of a centrifuge; that a chloride test is made on the stock in the decker chest every two or three hours to guard against color trouble or foam that may be encountered if bleached pulp is not washed sufficiently—a relatively high chloride content indicating poor washing, a low chloride test indicating good washing; that the degree of washing of unbleached pulp is determined by means of a pH determination; that unbleached kraft is tested for thoroughness of washing by titrating the slurry for total alkalinity; that a consisteney determination is made on the stock or slurry in the broke chest every two hours; that a fiber analysis is made on a composite of the samples from the broke chest taken for consistency; that consistency determinations are made on

clay, alum and size from composites made from samples collected at regular intervals during the day, each being added to the beater in the form of a suspension or solution; that clay suspension consistencies may be estimated by means of an hydrometer but, for accurate determinations, a unit volume of the suspension should be dried and weighed; that the strength of the alum solution may be determined by measuring the specific gravity of the solution; that the strength of the size emulsion can be determined by measuring its specific gravity, or, if a very dilute size suspension, such as two per cent, is used, it may be necessary to actually dry a sample and weigh the size to obtain sufficiently accurate results; and that it is necessary to have a man on each shift who is responsible to technical director, chief chemist, or beater room superintendent and to make all furnish changes through him.

The accuracy of such a system of beater room control, continued Mr. Hoffman, is demonstrated in the mill at Cloquet where pulp productions and amount of pulp used as totaled from beater room control records check within two or three per cent at the end of each month, and for a period of several months within one or two per cent. Mr. Hoffman likewise mentioned that a record is kept of the exact furnish used on the start of each order and of any change made in the furnish at any time during the run; that a record also is kept of the number of beaters of each furnish; that a pH determination is made on the stock in a beater before dropping to be sure the proper amount of alum has been added; that a consistency determination should be made on the contents of about every sixth beater as a check on the calculations of the beater room control man; that it is desirable, especially in mills where there are no consistency regulators ahead of the jordans, to make consistency determinations every two or three hours on the stock in the beater chest; that a consistency determination and a freeness test should be made about every two hours on stock going to paper machine; and that a total acidity and a pH determination are made and the temperature taken every hour on the tray water.

Mr. Hoffman added that there are several other tests which may be made a part of such a beater room control—including pH determination of water every two or three hours, if water has been treated with alum and filtered; testing size tub solution if mill has size tubs; and sewer loss determinations.

Instrumentation for Stock Level and Pressure

Stock Level and Pressure—Recording, Indicating and Control, the next paper scheduled before the Stuff Preparation meeting, was presented by A. H. Stanton, Manager Pulp and Paper Sales Dept., Mason-Neilan Regulator Co., Boston, Mass. Mr. Stanton, in this paper, cited factors affecting design of equipment for recording, indicating and controlling stock level and pressure; and briefly discussed a number of typical control applications.

In discussing the factors affecting design of such equipment, Mr. Stanton pointed out that the recording, indicating or control element must be free from plugging by the fibers; that materials in one instance must be acid resisting and in another, resistant to caustic; that information must be provided at a point either above or below the tank or pipe line, and often at some distance from the vessel; that actual temperature of stock must not influence accuracy of the level or pressure indication; and that abrasive effect of stock must be considered.

Reference then was made to three systems of control: air bubble, pressure bulb or rubber diaphragm box, and metal diaphragm with hydraulic transmission system. Mr. Stanton related in his remarks about these systems that the air bubble system permits recording or indicating with reasonable accuracy at low ranges of level or pressure, measured in inches of water, at relatively low initial cost; that it is equally workable at higher ranges to be measured in feet or pounds; that the air bubbles must be continuous or the system becomes inoperative and the air pipe plugs; that the pressure bulb or rubber diaphragm box system eliminates continuous air consumption and also any detrimental effect on stock having a lot of colloids present; that its best application for reasonable accuracy is at the higher ranges; that the metal diaphragm (stainless steel or plain steel) of the metal diaphragm with hydraulic transmission system is in contact with the stock; that the movement of the diaphragm, created by a slight change in level or presure, is transmitted by a small plunger so as to vary the pressure in a sealed hydraulic system, causing rotation of a helical coil which creates the record or indication; that the minimum range for this unit is 0 to 60 inches of water and is available in higher ranges in feet or pounds; and that same comparison made under pressure bulb type with air bubble type holds for this system.

The motion imparted to pen or indicating pointer by any one of the three systems described, continued Mr. Stanton, may also be utilized to cause motion of a flapper arm—thus an auxiliary operating air pressure may be varied so as to properly position a diaphragm control valve with the result that a desired predetermined stock level or stock pipe line pressure may be controlled.

Among the control application suggested by Mr. Stanton were overflow stock chest control, jordan suction pressure control, jordan discharge pressure control, head box level control and couch pit level control.

Cowles Classifiner

The last of the three papers on the program of the Stuff Preparation meeting, a paper entitled, *The Cowles Classifiner and Waste Paper Systems*, was the subject of Edwin C. Cowles, President, Cowles Classifiner Co., Princeton, N. J.

Mr. Cowles stated, in part, that the Classifiner is a machine which, up to this time, has been used principally in waste paper systems for defibering, screening and centrifuging paper stock; that the essential elements in a Classifiner are two disc screens of perforated metal, clamped parallel to each other in much the same way that the elements of a filter press are put together; that stock is introduced through the center of one of the screens and spun by an impeller; that dirt fractions, heavier than water, are centrifuged outward; that fibers and water pass through the screens; that the practice, until recently, was to continuously bleed off a small amount of reject stock from the periphery of the space between the screens and to carry off trash in this stock; that this rejected stock was diluted and strings and the like removed from it by a device called a Cowles detrasher, the diluted rejected stock then settled and returned to the inlet of the Classifiner; that a number of installations are now in operation in which the flow of rejects is closed off for a period through the use of a fully automatic non-clogging valve of the Saunders-type; that periodically this valve opens wide, discharging a full flow of tailings and completely scavenging the screening chamber; that the center member of the Classifiner also has been improved in design; that the Classifiner has been applied to the screening and classification of groundwood stock, to paper machine screening, and more recently to straw stock screening and defibering.

Multi-Stage Bleaching Developments

Developments in Multi-Stage Bleaching of Wood Pulp, a joint paper by M. W. Phelps and John Schuber, Technical Service, The Solvay Process Co., Syracuse, N. Y., was the first paper scheduled for presentation before the group meeting on Bleaching. It was brought out in this paper that the evolution of pulp bleaching practice during the past ten years has been a progressive development from original single stage methods to multi-stage processes of increasing complexity; that sulphite pulps may be bleached to a high white with good strength characteristics by a three stage system, whereas kraft pulps require four or more stages to effect satisfactory bleaching; that modern practice in multi-stage bleaching utilizes three essential treatments defined as chlorination, caustic extraction, and hypochloride stages; that the mechanism of the chlorination reaction varies with the hydrogen-ion concentration (pH) of the chlorinated stock; that the nature and economy of the pulp chlorination process are dependent to a large extent on the concentration of the initial chlorine addition; that the temperature of chlorination stage is also of importance in affecting pulp quality; that experimental data on kraft pulp chlorination discloses the harmful effect of high temperature chlorination; that the general purpose of the caustic extraction stage is to dissolve the water insoluble residues forming an integral part of the washed chlorinated pulp; that the alkali found best adapted to produce the maxi-

mum solubilizing effect is caustic soda; that the amount of caustic soda normally required for solution of the alkali soluble residues varies from 0.5 to 1.5 per cent on the o. d. pulp basis; that the pulp from the caustic extraction stage exhibits only a slight improvement in color over that of the original unbleached; that it has been demonstrated by bleaching experiments that pH values of 6.0 to 7.0 in the hypochlorite stage produce the most severe attack on pulp fiber; that the addition of alkali to the hypochlorite bleaching stage is doubly important in not only preserving a steady oxidation reaction, but to avoid the dangerous limits of pH where degradation of pulp quality may occur due to overoxidation; that the following sequences are representative of the ways in which the bleaching steps have been applied in multi-stage systems: (1) chlorination-hypochlorite-caustic extraction-hypochlorite—(2) chlorination, caustic extraction, chlorination, hypochlorite, caustic extraction-hypochlorite; that a new method consists of the following sequence—chlorination-caustic extraction-hypochlorite combined with caustic extraction-hypochlorite; that under certain conditions, the sequence of stages may be altered in the following manner: (1) chlorination-hypochlorite-caustic extraction-hypochlorite—(2) chlorination, caustic extraction-hypochlorite-caustic extraction-hypochlorite; that Method 1 may be applied to easy bleaching kraft, hard bleaching sulphite, or semi-sulphate pulps; that Method 2 illustrates a five-stage system which in reality performs six stages of treatment since the auxiliary caustic extraction is combined with the first hypochlorite stage; that this system will produce a bleached kraft of unusually high quality, but the plant is rather costly to build and operate; and that some of the European mills bleach with as many as six separate stages, but this practice has not yet been adopted on this continent.

Bleaching Research Observations

Observations on Experimental Multiple Stage Bleaching was the subject of the second paper on the Bleaching group meeting program. It was a joint paper, by Dr. John L. Parsons and Donald T. Jackson, both of the Hammermill Paper Co., Erie, Pennsylvania and was presented by Dr. Parsons.

Dr. Parsons related, in part, that in the bleaching of sulphite pulp fibers, four types of chemical reactions are considered: (1) removal of ligneous and other incrusting materials, (2) destruction of coloring matter, (3) chemical interaction between bleaching agent and dissolved incrusting materials, and (4) destructive attack on cellulose; that it is advantageous to conduct bleaching process to favor reactions 1 and 2 and to repress reactions 3 and 4; that multiple stage bleaching, wherein the first stage comprises a treatment of the fibers with elementary chlorine, followed by a washing away of the dissolved materials and then a treatment with a hypochlorite, appears to possess desirable features from the viewpoint of the types of reactions under consideration; that, by using a hot alkali extraction treatment between the chlorination and the hypochlorite stages, a further removal of oxidizable substances occurs; that the removal of the coloring matter or the whitening of the fibers in the hypochlorite stage can also be enhanced by maintaining a condition of alkalinity approximating pH 8-11; that, in general, chemical attack of the cellulose is proportional to the amount of hypochlorite consumed in the bleaching process; that, compared to single stage bleaching, multiple stage bleaching, with its attendant removal of oxidizable and undesirable substances from the fiber,

DR. EMIL HEUSER
Who Presented TAPPI Medal

offers an economy in total available chlorine consumed for a pulp of standard color; and that this economy in total available chlorine consumed is reflected in enhanced pulp properties.

Bleaching with Caustic Soda

The third paper on the program of the group meeting on Bleaching, a paper entitled *The Use of Caustic Soda in the Bleaching of Wood Pulp*, was the joint contribution of George E. Schmidt, Chemist; Brian L. Shera, Service Engineer; and T. W. Toovey, each of the Pennsylvania Salt Manufacturing Co., the first two from Tacoma, Washington, the latter from Philadelphia, Pennsylvania.

The paper, based on a study of three West Coast pulps made from Western hemlock (kraft pulp of moderate bleachability, sulphite of low bleachability, and sulphite of high bleachability) to determine effects obtainable through the use of caustic soda in pulp bleaching revealed that caustic soda improved the physical and chemical properties of the pulp tested; that the consumption of caustic soda reduced the consumption of chlorine and improved the final product; that a caustic soda treatment of between 1 and 2 per cent on kraft and 0.5 per cent on sulphite in the causticizing stage at moderate temperature and high consistency produced a pulp of higher color and quality; that a density of 15 per cent on kraft pulp was preferable to medium density of 9 per cent in the causticizing stage; that the ash content dropped appreciably in the high density causticizing and in all cases showed a decrease from the unbleached pulp in both kraft and sulphite; that the copper number was lowered with each increase of temperature or caustic dosage; that color, freeness, fold, copper number, alpha cellulose and viscosity showed generally improved values; that the bleached kraft and sulphite pulps showed increased freeness when compared to the unbleached pulp; that the Mullen tests, compared with the unbleached sample, show a slight increase in the case of the sulphite pulp and a loss of 25-30 points in the case of kraft pulp; that the tear on sulphite showed a general increase with caustic concentration; that the fold on kraft pulp showed a definite improvement with increased concentration and temperature, whereas it decreased with increased caustic treatment on sulphite; that the alpha cellulose content of the kraft pulp showed a slight corresponding increase with increased temperature and caustic treatment; that the hard sulphite exhibited a linear increase in alpha cellulose with increased caustic treatment; that the viscosity of the kraft pulp was higher in tests where temperatures and caustic concentration were increased; and that the viscosity of the sulphite pulps was higher with increased caustic concentration at the same temperature.

Bleach Liquor Stability

The succeeding paper, *The Effect of Alkalinity and Impurities on the Stability of Calcium Hypochlorite*, by C. M. Connor, Valley Forge Laboratories, Inc., West Conshohocken, Pa. was presented by L. Justice, an associate of Mr. Connor in making the study upon which the paper was based.

The study was undertaken to determine experimentally the stabilizing effect of excess alkali on commercially prepared calcium hypochlorite. As a result of the work, it was observed that a total alkalinity, expressed as calcium oxide, of 0.1 gram per liter to 0.2 gram per liter is as effective as 1 gram per liter; that some hydrate concentration must be present to allow for carbonate solubility; that the effect of exposure to air on the alkali concentration is evidenced only on sample of lowest alkalinity; that neither the hydrate concentration nor the carbonate concentration in the samples of high alkalinity changed appreciably on exposure; that the hypochlorite stability also was unaffected by exposure to air except in sample of low alkalinity; that magnesium chloride neutralizes the hydrate and carbonate content with a resulting formation of bicarbonate; that the hypochlorite stability is affected only slightly by this reaction; that ferric chloride results in similar alkalinity change but this change is accompanied by a drastic reduction in the hypochlorite

strength; and that aluminum chloride at a concentration of 1.5 grams per liter has no effect on either the alkalinity or the hypochlorite decomposition rate.

Bleach Plant Design

W. L. Savell, Mathieson Alkali Works (Inc.) was on the program for the presentation of the last paper before the group meeting on bleaching. His subject was *The Time Cycle Chart in Bleach Plant Design.*

Design and Use of Disc Refiner

The first of the three papers on the program of the afternoon group meeting on Stuff Preparation was entitled *Disc Refiner Design and Application;* and was contributed by D. Manson Sutherland, Jr., President, Sutherland Refiner Corporation, Trenton, N. J.

In this paper, Mr. Sutherland brought out that considerable loss of refining occurs when the gap between the discs is increased 0.002 to 0.004 inch; that discs designed for efficient refining action on soda pulp will be efficient on sulphite and sulphate fibers when operated with an increased gap; that discs designed for sulphite and sulphate will not be efficient on soda pulp because the incoming fiber size of the latter is much smaller; that the use of orifices to control capacity of discs is a new and important feature; that, in regular practice, orifices are designated as constant, inserts, and external (constant orifices being machined into check ring and changed only by removing discs and re-machining orifices —inserts being removable but necessitating shut down of refiner to do so—external orifices permitting adjustment of capacity while refiner is in operation); that the refining action in a disc refiner takes place on the side of the disc instead of its periphery and, when properly designed, the refining action commences at a diameter of 10 inches and finishes at a diameter of 42 or 48 inches; that modern discs of 48 inch diameter cannot be operated efficiently beyond 450 r. p. m.; that long life of tackle in any refiner is necessary to insure control and uniformity of stuff properties; that improvement in design of discs during last three years is best illustrated by slight rise in temperature for a given freeness drop that is now obtained as compared with temperature rise obtained previously; that, in a book mill, it has been common practice to beat sulphite, soda and broke together, but when base refining is used, the sulphite and soda are refined separately and the broke, already refined, requires only defibering without further slowing the drainage rate; that these separate stuffs are blended together in a mixer of some suitable type and discharged to the machine chest; that the stuff is then passed through another refiner to give necessary final refining action before going to the wire; and that the use of high capacity refiners for base refining will eliminate the use of the large number of beaters and refiners now required to furnish the average paper machine.

Cost Data on Refining Units

Next on the program was a paper by the TAPPI Stuff Preparation Committee on *Economic Factors of Refining,* and in which it was revealed that a review of Lockwood's Trade Directory showed, eliminating broke beaters as far as possible, 4972 beaters and 2567 refiners in the mills of the United States; that the average capacity of all refining units, obtained by dividing total tonnage produced by number of units, is only five tons per day; that the average capacity per refiner per day in glassine is 2 to 3 tons, in book papers—6 tons, in paper boards—10 tons, and in kraft liner—25 tons; that the advantages of large capacity refiners are:

(1) less floor space, pipes and valves;
(2) less labor;
(3) lower maintenance, and
(4) greater uniformity in stuff properties possible; that the cost of power for refining varies according to the degree of refining action required for a given grade of paper and power costs vary in each mill but the average cost is estimated to be $1.50 per ton of paper; that the power required and cost for glassine, book papers, paper boards and kraft liner is approximately as follows:

glassine—27/hp./day/ton
$1.62 per ton—
book papers—16/hp./day/ton
$0.96 per ton—
paper boards—10/hp./day/ton
$0.60 per ton—
kraft liner—16/hp./day/ton
$0.96 per ton;

that refiners having a capacity of 100 tons per day could reduce the power at least 50 per cent or the power bill $8,250,000 per annum; that it would be advantageous to have only one or two refiners instead of ten or more but there now seems to be a tendency to boast about large numbers of refiners per paper machine instead of less; that one of the largest items of cost in paper, and, to a less extent, in board manufacture, is off grade paper and board which must be sold as second or re-used as broke; that, with the development of standard specifications for many grades of paper and the more exacting demands of the consumer, the manufacturer is looking for new equipment to aid in maintaining a consistently standard quality produet; that Arthur B. Green in the November 13, 1937 issue of the *Paper Mill,* lists eleven distinct actions that occur during the beating and refining process, namely:

(1) cutting of fibers by knife edges,
(2) cutting of fibers by fibers,
(3) crushing of fibers between surfaces,
(4) crushing of fibers between fibers,
(5) rubbing of fibers between surfaces,
(6) rubbing of fibers on fibers,
(7) impact of fibers on surfaces,
(8) impact of fibers against fibers,
(9) impact of surface on surface with fibers between,
(10) hydrostatic pressure (sustained and intermittent), and
(11) vacuum (sustained and intermittent);

and that a carefully formulated plan of fundamental research on the problems of beating and refining conducted under competent supervision will reveal the important information which is sorely needed for the more intelligent and proper designing of stuff preparation equipment.

Stock Preparation Control

Controlled Stock Preparation, a presentation by Harry K. Williamson, Harry Williamson Research Corp., followed by an unusually lively discussion completed the formal program of the afternoon group meeting on Stuff Preparation.

Waste Paper Trends

The management group meeting opened with a paper by P. M. Loddengaard, Bulkley, Dunton Co., on *Trends in the Waste Paper Industry.*

Mr. Loddengaard called attention to various sources of origin of waste papers; mentioned briefly the work of the junk man; commented that most of the old paper comes out in the spring with a resultant increase in price during the summer months; and related that something should be done to get mixed papers to be moved every day. He said that board mills are the largest consumers of mixed papers. Reference also was made to the increased tonnage of the South, the belief being expressed that this tonnage was far greater than the increased consumption of boxes.

Mr. Loddengaard then related that advantage be taken of the largest supply of waste paper ever known by insisting that it be made cleaner and more suitable for use; and suggested that office buildings, hotels, etc. should pay for removal of waste papers from their premises, a suggestion which, he said, was not new.

In his further comments, he stated that the average board mill would prefer mixed paper if it could be as clean as newspaper; that there was too great a laxity of too many consumers accepting poor quality paper stock; that careful consideration should be given to program for conservation of mixed paper supply; and that waste paper prices must be equitable.

Controlling Quality in Board Mill

Quality Control as Applied to a Paperboard Mill, by R. H. Rositzke, R. H. Rositzke & Associates, New York, N. Y., was the subject of the second paper presented before the Management group meeting.

Mr. Rositzke related that the modern method of papermaking involves a knowledge of power plants, machinery and mechanics, chemistry, some biology and a basic appreciation of physics, to say nothing of the requisite ability necessary for properly co-ordinating all of these values; and that the problem now is to co-ordinate the divergent interests of all people directly or indirectly connected with papermaking so that: (a) the customer is supplied with a product at a price commensurate with the quality delivered; (b) the maintenance of a stand-

ard of living for all those concerned with papermaking which will fully justify the industry's existence as an American institution; (c) the justification of the improvement in the industry's standards of living must in turn come through advanced contribution of the industry to our standards of living through improved product, advanced application and greater uniformity of the delivered product.

There are several ways, he said, whereby the performance of a company or unit may be judged, namely: (1) a comparison of the tonnage of a given item that was produced and sold by the company, as related to the tonnages distributed by the industry as a whole; (2) a comparison of what the company itself sold compared with its own returns and allowances.

He added that, in controlling quality, there is no single solution applicable to all paper mills; that standards of a given mill will be controlled to the degree of the technical ingenuity of its staff, the definite nature of customer's specifications and the prevailing practices of the industry; that the degree of possible quality of any board is limited by the original specification; and that definite specification data are of advantage for the following reasons:

(1) After establishment of laboratory test limits and standards, the papermaker is in a definite position to measure the result of changes in formulation or processing upon the final check results;

(2) Should a board having practically the same finish specification but decidedly different physical characteristics be required, the papermaker has a far better background for reformulation because of the guidance derived through previous tested and recorded results;

(3) A more definite knowledge as to the profitability of each and every board is obtained, because of the normal relationship of furnish to finished board;

(4) The way is paved for the establishment of more definite standards of quantity and quality for materials to be purchased—and

(5) It aids production planning—it enables the planning of machine time requirements and is a basis for specifying quantities of various materials required in advance of the production schedule.

Analysis of machine activity, he continued, gives a definite method for avoiding machine trouble before it starts and indicates a method for calculating hidden losses involved in bad, broke and strip production.

Concluding remarks of Mr. Rositzke were devoted to a discussion of incentives. In this connection, he said that there are two divisions as to personnel necessary in the establishment of mill incentives—(1) incentive measures which will give an inducement to the mill supervisory force for improvement of all controllable quality and expense items which come under their control or jurisdiction—(2) the incentive inducements for the rank and file of the mill force which will be limited to the factors within the control of the mill crews.

Setting up of duties to be performed on each and every designated job and fixing of relative worth of all such occupations through job evaluation were the two steps cited as being essential to the proper establishment of such incentives.

Quality Control and Inspection

A report by TAPPI Production Management Committee of which Dr. Louis T. Stevenson, 60 East 42d Street, New York, N. Y., is Chairman, completed the program of the Management group meeting. This report, entitled, *A Survey of Quality Control and Inspection in Paper Mills*, stated that quality control is made effective by setting standards for product and processes and then seeing that these standards are maintained; that the main functions of a technical department, whether consisting of one man or many men, are: (1) assist management in setting standards for process and finished products—(2) assist in maintaining quality of product—(3) investigate and report on complaints—(4) assist in developing new products—(5) conduct research—(6) assist management in the elimination of wastes; and that actual maintenance of quality is clearly a function of the operating division.

GEORGE WELP
Speaker at TAPPI Luncheon

Dr. Stevenson related that a questionnaire was sent out by the committee to establish present practices in the organization of the quality control function within the industry. This survey revealed, as a consensus of opinion, that the technical director work closely with the superintendent but to be ultimately responsible to the mill manager. It likewise showed the need for co-ordination of the technical department with the production division; that product and process standards are authorized by the mill manager generally in consultation with the sales, production and technical divisions; that present practice, on the average, requires one man in the technical division for every 14.64 tons of product made; that technical men are taken from within the organization when possible; that the control department provides a suitable training for men who are later transferred to the sales or operating departments; that about 20 per cent of the mills representing a little less than one-third of the tonnage reported incentives in the technical department; and that the bulk of the reporting mills use TAPPI testing methods either exclusively or to a very large extent.

Third Day's Sessions

Morning sessions of the third day of the convention included two group meetings, one on Paper Manufacture and the other on Acid Pulping. George D. Bearce, Maine Seaboard Paper Co., and A. O. Spierling, were listed as Chairmen of the group meeting on Paper Manufacture; while Vance P. Edwardes, International Paper Co., was Chairman of the meeting on Acid Pulping.

Pigmented Papers

Properties of Pigmented Papers, a joint paper by William R. Willets and Richard T. Bingham, both of Paper Development Laboratory, Titanium Pigment Corporation, 99 Hudson Street, New York, N. Y., was the first paper on the program of the meeting on Paper Manufacture. It was presented by William R. Willets, who reviewed the results obtained in testing unpigmented sheets and sheets pigmented with titanium dioxide—the sheets including all rag bonds, 75 per cent rag bonds, 25 per cent rag bonds, and all sulphite bonds. Mr. Willets commented that it may reasonably be assumed that the presence of large amounts of filler will affect the strength of a sheet of paper adversely; that the loss in strength will be dependent on just how much of the fibrous material is replaced by the mineral; that a sheet made opaque by using a large amount of low strength filler will be much weaker than a sheet made opaque by using a small amount of a high strength pigment; that in no case, in the data covered by the report, was it necessary to have a titanium dioxide content of much over 4 per cent to make sheets highly opaque, bright and white; that if ordinary fillers had been used in an attempt to obtain the same opacity, the ash content would have been much greater (probably almost 10 times the amount); and that titanium pigmented bond papers are finding an extended use because of high opacity, brightness and whiteness.

L. S. Reid, Metropolitan Life Insurance Co., New York, N. Y., in commenting upon the joint paper by Mr. Willets and Mr. Bingham, said that a little over two years ago the Metropolitan Life Insurance Company set up specifications for its contract papers; that the specifications for all of the rag bond call for opacified paper; that sulphite bond specifications call for both opacified and un-opacified paper; and that comparative figures on sulphite bond show a slight increase in folding endurance and in bursting strength for the opacified paper, as compared to the un-opacified paper.

Use and Effect of Alum

The second paper on the program of the Paper Manufacture group meeting was presented by L. M. Booth, President,

Booth Chemical Co. His subject was *Alum—Its Use and Effect* (THE PAPER INDUSTRY—January 1938).

Mr. Booth said that the composition and influences of each of the components of alum should be better understood and appreciated; that the acidity of the alum serves to break down size emulsion, to harden the stock if required and to provide the acidity necessary for use with a number of dyes employed in the paper industry; that the alumina content is a valuable aid in retention of rosin in sizing, filler and dyes, as well as for controlling water drainage on the paper machine; that of the 315,000 tons of alum distributed in 1935, *Chemical & Metallurgical Engineering* estimates that 117,500 tons were used in the pulp and paper industry in the United States; that frequently, when papermakers need more alumina in the system they add more alum without considering how the alumina is to be precipitated and thus to become of service; that whenever alum is added the sulphates are increased at nearly three times the rate at which the alumina is increased; that often the net effect of the addition of more alum runs counter to the papermakers purpose for the reason that an excessive quantity of acidity hampers sheet formation; that in mill practice it should be remembered that pH measurements are not quantitative for weights or volumes of acidity or alkalinity; that titration and pH tests, in the absence of supporting data, do not tell what has become of the alumina portion of the alum; that an increased demand for fundamental data will naturally result in the development of suitable indicating and recording instruments in order to evaluate and control wet end performance; and that the familiar array of indicators and recorders, to be found in the modern steam and electric generating plant, encourages the hope for similar development for the wet end of the paper machine of the future.

Wire Drainage Study

The succeeding paper, a joint paper by Harry G. Specht, Eastwood Nealley Corp., Belleville, N. J. and C. M. Connor, Valley Forge Laboratories, Inc., West Conshohocken, Pa., on *Factors Influencing Drainage Through Fourdrinier Wires*, was presented by Mr. Specht. This paper covered a continuation study of the work reported by Mr. Specht at the February 1937 meeting of TAPPI. As a result of the past year's work, the conclusions outlined at that time are reaffirmed. These conclusions were: the rate of drainage is greatly affected by temperature—in general, the drainage of the stock follows closely the viscosity curve of plain water—with increase of temperature and pH the freeness decreases at a more rapid rate after the maximum increase has been reached—there is a critical or maximum pH point for freeness for each type of furnish—wires can be correlated in regard to freeness—the rate of drainage of stock varies with the wire mesh. Likewise, Mr. Specht pointed out that in general, as yet, little can be said definitely about the effects of sulphuric acid vs. alum or the effects of hardness on the drainage characteristics of a stock; that certain well defined trends are indicated but in order to verify them would require a great deal more investigation than has been given the problem to date, that other variables, at present not considered, may play parts which would have to be evaluated before anything more positive than a direction can be formulated; that from a practical standpoint, the trends may be quite sufficient as in most instances the ranges are broad enough to allow for a relatively indicative solution of a problem; and that unquestionably, the type and condition of water, as well as stock contamination of all sorts, play an important part along with the structure of the wire and machine conditions, in ultimate drainage results.

The Vortrap Explained

The next paper on the program of the Paper Manufacture group meeting, a paper by Horace Freeman, Technical Director, Consolidated Paper Corporation, Ltd., Three Rivers, Quebec, on *The Vortrap*, summarized briefly the trouble caused by the presence of dirt in papermaking stock and the means and methods hitherto available for removing the dirt; recounted the need for and the development of the Vortrap; and described the Vortrap's construction and operation.

Mr. Freeman stated, in part, that particles of bark, wood skin, knot, rubber, iron filings, pipe scale, grease, pitch, grinder stone, grit, sandstone, cement, lime, digester brick, wire, etc. are among the impurities, not removed by screens, which cause loss in paper production and mar the product; that the major part of the impurities which cause trouble to the papermaker are heavier than the fiber; that riffers and, more recently, centrifugal machines have been used to remove such material from stock, and that the development of the Vortrap in the laboratories of the Consolidated Paper Corporation, Three Rivers, Que., was prompted by the need for a simple and efficient means for removing general dirt from coarser grades of paper, such as newsprint, kraft wrapping and bag papers.

A single Vortrap, continued Mr. Freeman, comprises a cylinder, long in relation to its diameter, that is supported vertically and is provided at its upper end with a headpiece designed to allow the entrance of stock to be cleaned tangentially under pressure. This headpiece also provides an escape for cleaned stock along its central axis.

The principle of operation of the Vortrap was explained by Mr. Freeman as follows: Under the influence of pressure imparted by a pump, the stock travels with a rapid rotary motion downward in the cylinder. Dirt which is heavier than fiber is concentrated against the wall of the cylinder, travels downward to a middle diaphragm, and spirals rapidly to a circular aperture in the diaphragm. This aperture has approximately one-third the diameter of the cylinder, and the bulk of the stock, due to the energy imparted to it and to the fact that water is not compressible, passes on down through this aperture but in a helix of much smaller cross-section and, therefore, of greatly increased speed (r. p. m.). The already separated dirt consequently is carried down through this aperture at increased speed and is again flung to the wall of the lower section of the cylinder, continuing downward to a lower diaphragm where it passes down through one or more peripheral apertures into a funnel. In this funnel, the dirt and a slight amount of separated stock has substantially no rotary motion. The dirt consequently settles through the neck of the funnel into a dirt receiver. The cleaned stock returns upward along the axis of the cylinder in a helix of much greater speed. The result of this increased speed is to separate finer and still lighter particles of dirt. The upward helix in passing through the central aperture of the middle diaphragm is further constricted and separation of dirt is again emphasized. The cleaned stock finally passes out of the exit with its pressure reduced and energy expended.

Practical considerations, continued Mr. Freeman, dictate the dimensions and capacity of the Vortrap—experience showing that 4 inches diameter and about ten times this length gives best operating results. A single unit, he said under a pressure of 20 lb. and handling a stock suspension containing 0.5 per cent fiber at the rate of 160 Imperial gallons per minute, will deliver approximately 6 tons of a. d. fiber in 24 hours.

For greater capacities, added Mr. Freeman, a multiplicity of these units are connected to a common inlet manifold and to a common outlet manifold—the usual inlet pressure being 25 lb., and the outlet pressure 3 lb., while the energy consumption is 10 hp.-hours per ton of stock (0.5 per cent consistency). Mr. Freeman further stated that one or any number of Vortraps may be out of the circuit by simply closing valve connections to manifold; that receivers are emptied once a shift or once a day, as required; that a Vortrap installation separates about one pound (dry basis) of dirt per ton of newsprint and up to 2 pounds per ton of kraft, the actual amount depending entirely on local conditions; and that the equipment is applicable to uses other than the cleaning of stock, such as the classification of china clay, the removal of grit from milk-of-lime, and the clarification of bleach liquor.

Waste Committee Report

C. M. Baker, Consulting Engineer, Madison, Wis. and Chairman of the TAPPI Waste Committee, presented the next paper as a committee report. The subject was *White Water Surveys.*

There are seven important factors, according to Mr. Baker, to consider in a white water survey, namely:

1. Selection of the point or points in the mill where flows are to be measured and samples collected.
2. Flow measurements of mill wastes.
3. Collection of representative composite samples.
4. Analyses of samples and their significance.

5. Interpretation or evaluation of results.

6. Tolerances with reference to volume and stock losses.

7. Records or graphs for presentation and comparison of results.

In discussing these factors, Mr. Baker related that the points selected for obtaining samples and measurement of flow will depend largely upon local conditions in each individual mill, particularly the layout of sewers and their accessibility; that an ideal layout permits the collection of samples from each of the separate units of the mill and from a single main sewer into which the effluent from each of the units discharges; that subject of flow measurements is discussed in detail in proposed tentative standard for Flow Measurements of Mill Wastes; that a small sample, in amount proportional to the flow, should be collected frequently throughout the 24 hours—preferably every fifteen minutes or one-half hour and at least every hour; that the individual samples should be poured into a large container, and, after thorough mixing, a composite sample taken for analysis; that there are several automatic sampling devices on the market, a number of which are operated by a paddle wheel in the flow of water; that such devices are reasonably satisfactory in the main sewer when the flow is relatively uniform, and are more practical for continuous or routine operation; that, for analysis of samples and their significance, reference should be made to standard methods *Measuring, Sampling, and Analysing White Waters* (M400 p-36); that care must be exercised in the interpretation of both flow measurements and analytical results; that excessive maximum or minimum flows should be checked to determine whether the recording apparatus has been functioning properly or whether the results may have been influenced by rains or other outside factors; that unreliable results should be discarded in computing averages; that it is desirable that standards or permissible white water losses be adopted as an index of efficiency (reference made to *Technical Association Papers*, Series XIX, 1936, Page 425); and that it is essential that accurate and continuous records be kept of white water losses, first, as a measuring stick to evaluate results of improvements made, and second, to determine any unusual losses, in order that corrective measures may be initiated.

Diagnosing Paper Biologically

Biological Methods in Paper Diagnosis by H. N. Lee, A. D. Little, Inc., Cambridge, Mass., the next paper on the program of the group meeting on Paper Manufacture, outlined possibilities of applying and extending biological data and technique in the practical diagnosis of paper and in the investigation of paper problems. Such methods said Mr. Lee, are equally valuable in fundamental research but it is in discovering facts which can be directly understood and applied in every day papermaking that particular reference was made.

Attention was called to several books in which methods of preparation and examination are fully described. These books included *Lee's Vade Mecum*, and *McClung's and Chamberlain's Plant Histology*, and *Schwarz Textile Microscopy*. Mention likewise was made to a new embedding procedure that is being used in the textile laboratories of the Massachusetts Institute of Technology, especially in studies of sizing.

Specific applications of biological methods to paper, that were cited by Mr. Lee, included the study of dirt, fiber analysis, starch, rosin sizing, beating and pressing, and writing and printing ink. According to Mr. Lee, such methods present a tool now practically unused that gives results which are easily understood and which can be directly and most practically applied. Some of the applications were illustrated through the use of lantern slides.

Glassine Transparency

Dan B. Wicker, Associate Professor of Chemical Engineering, North Carolina State College of Agriculture & Engineering, Raleigh, N. C. was next on the program with a paper on *The Fundamentals of Glassine Transparency*. This paper, the second of a series of three papers on glassine transparency, presented the results of an instrumental study including measurements with a photometric device, a General Electric Reflection Meter, a Bausch and Lomb Opacimeter and a General Electric Recording Color Analyzer. It is shown that transparency ratio and diffuse transmission ratio indicate both the clarity of resolution of an image and the reduction in contrast when a sheet is being seen through. These two ratios become more sensitive to differences in quality as sheets become more transparent. Contrast ratio and per cent contrast visibility indicate the reduction in contrast effected by a covering sheet and become more sensitive to differences in quality as sheets become less transparent. It is concluded, stated Prof. Wicker, that there exists an empirical linear relationship between total transmittance and contrast ratio values for sheets of approximately the same absorptive properties.

Papers by Title

Two other papers, both of them scheduled for presentation by title, completed the program of the group meeting on Paper Manufacture. One of these papers, a paper entitled *Freeness Studies with a Recording Freeness Tester*, was the subject of F. M. Williams, President, Williams Apparatus Company, Watertown, N. Y. The second paper was entitled *An Analytical Study of Various Pulps with Reference to Alkali Binding and Rosin Sizing*. Its contributor was M. D. Downs.

Blue-Stained Pine Pulps

The first of four papers to be presented before the group meeting on Sulphite Pulping was a joint paper by G. H. Chidester, M. W. Bray, and Dr. C. E. Curran, Engineer, Senior Chemist, and Principal Chemist respectively, U. S. Forest Products Laboratory, Madison, Wis., on *Characteristics of Sulphite and Kraft Pulps from Blue-Stained Southern Pine*. It was brought out in this paper that sulphite and sulphate pulping experiments were conducted to determine the effect of the blue stain produced in loblolly and shortleaf pines by inoculation of stored chips or by natural development in pulp logs under ordinary mill yard storage conditions; that the blue-stained wood gave unbleached sulphite pulps that were darker in color, had a higher dirt content, and required more bleach than the pulps from unstained woods (these differences being proportional to the percentage of stained wood used); that no significant differences in the yield or strength properties of the pulps resulted from blue stain, nor were any appreciable differences noticed in the results of inoculated and naturally infected wood; that the unbleached sulphate pulps from the blue-stained wood were also darker in color contained more specks, and required from 2½ to 5 per cent more bleach than the pulps from the unstained wood; that, as in the case of sulphite pulps, no difference in yield was attributable to blue stain; and that no appreciable differences were noticed in the effects of staining in field and in the laboratory.

Pine Sulphite Pulp Comparisons

Comparison of Sulphite Pulps from Fast Growth Loblolly, Shortleaf, Longleaf and Slash Pines, the second paper on the program, was a joint contribution of G. H. Chidester, J. N. McGovern and G. C. McNaughton, Senior Engineer, Assistant Technologist and Senior Engineer respectively, U. S. Forest Products Laboratory, Madison, Wis. Pulping loblolly, shortleaf, longleaf, and slash pines of similar growth charactertstics (rapid growth material) according to results of the investigation upon which the paper was based, point to the conclusion that a variation of 10 per cent in springwood content in any one species results in a greater difference in pulp quality than is exhibited between the different species examined. The relative quantities of springwood, likewise, were found to increase from the butt to the tops of all four species examined and the density varied in a reverse fashion. All strength properties of the pulps, excepting tear resistance, improved with an increase in springwood contents. The results further emphasize that pulp quality can be very definitely influenced by selecting the growth type of wood used.

Chip Length Study

Another joint contribution, a paper by Howard Morgan and Henry Philip Dixon, Jr., Research Associate and Graduate Student respectively, The Institute of Paper Chemistry, Appleton, Wis., was next on the program. This paper, covering a portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Master of Science from Lawrence College, Appleton, Wis., June, 1937, was presented by Mr. Morgan.

The paper entitled *The Relation Between Chip Length and Uniformity of Delignification in Sulphite Pulping*, revealed that freshly cut red spruce wood, seasoned to an average moisture content of 38 per cent, was used for all experiments; that the wood was 40 years old, with an annual increase in diameter of 0.175 inch; that the specific gravity of the dry wood was 0.43; that the bisulphite cooking liquor used was made from slaked lime, water and commercial liquid sulphur dioxide; that the combined sulphur dioxide was 1.25 ± 0.02 per cent for all cooks; that the free sulphur dioxide was maintained at 4.5 ± 0.02 per cent; that a liquor to O. D. chip weight ratio of 4.5 to 1 was used; that one-half, three-fourths, one, and one and one-fourth inch chips were cut for all experiments; that, after cooking, the digester pressure was relieved, the cooking liquor drained, the chips carefully removed without appreciable disintegration, and allowed to wash by diffusion in large volumes of water overnight; that a portion of the chips were completely disintegrated by vigorous agitation to give a sample of pulp average for that size; that the chips in another portion were cut across their length to give three equal sections—two end sections and a middle section; that the two end sections were combined and both samples disintegrated; that the three samples, average, end, and middle of the chips, were again thoroughly washed; and that the permanganate number was used as a measure of degree of delignification of samples of the average pulp for each chip size and of the samples representing the end and middle sections of chips in each size fraction.

Conclusions drawn from the investigation indicate that the degree of delignification under normal cooking conditions varies greatly with chip length and the normal variations encountered in mill chips may be expected to give a wide variation in quality of pulp from different length chips; that increasing the time to reach a temperature of 110 deg. C. in the cooking schedule from 1½ hours to 4 hours reduces the differences between short and long chips to same extent but does not give uniformity between different lengths which can be considered satisfactory; that the use of high pressure from the start of the cook instead of following the normal pressure rise does reduce these differences to a reasonable suitable value and in addition gives an economic advantage of reduced cooking time; that large non-uniformities exist in the degree of delignification obtained in different parts of the chips; that increasing the time to 110 deg. C. to 4½ hours gives only a very slight reduction in non-uniformity; that high initial pressure which is maintained through the cooking cycle does give a marked improvement in uniformity of delignification; and that chip thickness, as well as length, has an important effect on the uniformity of penetration and cooking.

Naf-Schauffelberger Circulation System

The Acid Pulping meeting was concluded with a paper on *The Naf-Schauffelberger Digester Circulation System* by Torsten Samson, consulting engineer for N. A. F., Stockholm, Sweden.

Mr. Samson related that the heating of a digester with a constant steam temperature follows a line which is logarithmic; that, at the beginning, the temperature difference is great, and, if both the circulation and heater are ample, the full temperature difference cannot be utilized—the steam must be throttled; and that, at the end, however, the available temperature difference is small, necessitating the heater and circulation to be dimensioned for the end of the heating period.

He added that straight line cooking, which has been practiced in some places, has no object when circulation is good; that Borchers and Bryde have shown by laboratory experiments that sulphite digesters can be heated very quickly if they are evacuated well before filling with acid; and that chips can be steamed in place of evacuation but that steaming with a steam chip filler is not sufficient by any means.

Mr. Samson did not accept the point of view of some engineers who claim that circulation is not needed after the heating. Rather, he stated that circulation until the end of the cook does a lot of good—the pulp getting decidedly whiter by so doing.

The remarks of Mr. Samson also brought out that a long and narrow digester requires less circulation than a short and wide one; and that the Naf-Schauffelberger apparatus for both sulphite and sulphate digesters is much alike.

He stated further that a much discussed question is the formation of scale in the apparatus for sulphite pulp digesters, some claiming that polished tubes are necessary, that the speed of the acid must be very high and that it is an advantage to pass the acid through the channels formed by two concentric tubes, but that such claims cannot be withheld.

Mr. Samson then stated that the scale consists of gypsum; that it is formed if the initial acid contains much gypsum; that the gypsum content increases during the cook through an autocatalytic process; and that, if the initial acid is nearly saturated with gypsum, the acid will soon be saturated and cause gypsum to settle on the tubes.

Among the design factors touched upon by Mr. Samson were: avoid boiling in the heater; circulate properly and sweep away gas bubbles; and surface variations cause corrosion. In the Naf-Schauffelberger circulation system, he concluded, the various parts have comparatively small dimensions; the pipes are slender; stresses are small everywhere; and a handy apparatus is obtained by using small dimensions.

Luncheon Meeting

The early part of the afternoon of the third day of the convention was given over to the Annual Luncheon. At this luncheon, Mr. Collins, retiring president, introduced B. D. Millidge of Howard Smith Paper Mills, Cornwall, Ontario, as President of the American Pulp and Paper Mill Superintendent's Association; Dr. G. I. Hoover, as Chairman of the Canadian Technical Section; Frederic C. Clark, Mill Manager, Paper Mill Division, Pond's Extract Co., Seymour, Conn., as TAPPI's in-coming President; and Harold R. Murdock, Director, Research Department, Champion Paper and Fibre Co., Canton, N. C., B. M. Thomas, Mill Manager, Container Corp. of America, Manayunk, Philadelphia, Pa., Lorne C. Anderson, Manager of Manufacturing, Ontario Paper Co., Thorold, Ont., George D. Bearce, Manager, Maine Seaboard Paper Co., Bucksport, Me., and G. S. Brazeau, Manager, Everett Mill, Weyerhaeuser Timber Co., Everett, Washington, as members of TAPPI's Executive Committee. Mr. Collins then paid tribute to "Oscar of the Waldorf" who, because of illness, was unable to be present to welcome TAPPI delegates and guests, as has been his custom for a number of years.

"Selling Speed"

George Welp, Advertising Manager, Interchemical Corporation, New York, N. Y., was next introduced as guest speaker of the occasion. His subject was *Selling Speed*. In highlighting Mr. Welp's address, he said that speed is the spirit of our times; that selling speed is the concern of nearly every branch of trade; that intaglio printing has achieved new speeds; that roto magazines with circulations as high as 7,000,000 copies are run off in handsome colors every week; that the publishers of *Life* asked for a magazine printed on coated paper using plenty of color, and printed on a four-day, up-to-the-minute news schedule; that paper manufacturers got to work and developed a paper that met these exacting specifications; that the ink maker, too, had something to do with making *Life* possible; that advances in press machinery plus the all-important factor, the skill of an expert printer, complete the picture and *Life* magazine, with all its original "impossible" requirements, is a reality; that photographs are sent by wire or by air; that the Crowell Publishing Company has announced that they will inaugurate a private airline to fly between New York and their plant at Springfield, Ohio, in order that new fast printing schedules at Crowell will not be held up when mail or train schedules are too slow; that whether we like it or not, to compete in this age of graphic arts miracles is to accept new standards of speed and quality which change at a dizzying pace; that *Selling Speed* demands *Speed Selling;* that the answer is multiple salesmanship; that multiple salesmanship is personal salesmanship multiplied many times; that Speed Selling demands better trained salesmen, closer supervision of salesmen, more co-operation with salesmen, more effective sales promotional material, better printed salesmanship to prepare prospects for personal calls, more attention to cultivation of prospects between salesmen's calls, and thorough coverage of every influential factor in a sale (surround the account); that printed salesmanship can help the personal sales force by furnishing care-

fully prepared, accurate descriptions of new products and processes, by putting in salesman's hands practically prepared sales talks, and by furnishing prepared sales presentations to insure uniform and tested selling methods; that these sales aids save the salesman's time by preparing the way for his call; and that printed salesmanship, the most efficient method of multiplying personal salesmanship, is the answer to today's need for Speed Selling.

Mr. Welp concluded his remarks by saying that Selling Speed has no patience with "stay put" methods; that it asks for the best today; that it demands the impossible tomorrow; and that to all of us it says, "Reach for the moon . . . or reach for your hat!"

After the completion of Mr. Welp's address, Mr. Collins read a congratulatory radiogram received from the Norwegian Technical Association, and then called upon Dr. Emil Heuser, Institute of Paper Chemistry, Appleton, Wisconsin, to present the TAPPI medal to Dr. Carl Busch Thorne, Vice President, Canadian International Paper Company, for his outstanding contributions to the technical progress of the pulp and paper industry.

TAPPI Medal Presentation

Dr. Heuser, in making the presentation, related that Dr. Thorne was born in Norway, obtained greater part of his college education in Germany, and came to the United States in 1902 for the purpose of studying American methods of pulp and paper manufacture. After a short orienting experience as an engineer in New York, Dr. Heuser continued, Dr. Thorne visited most of the mills in the eastern part of the United States, and one year from his arrival joined the Riordon Pulp and Paper Company in Hawkesbury, Ontario. Dr. Heuser also stated that Dr. Thorne, at the age of only twenty-seven years, was entrusted with the management of the Hawkesbury mill, and later of the Merritton mill; that his endeavors led to a then new sulphur dioxide recovery system which was gradually adopted, and further developed by other Canadian and American mills; that in 1912 he conceived the idea of replacing wooden acid towers with towers of re-inforced concrete, and erected the first concrete acid tower at the Hawkesbury mill; that his studies on wood preparation led to the development of the Thorne barker, which is now built to bark logs up to sixteen feet in length; that construction of the Kipawa mill, under Dr. Thorne's personal direction, started in 1918; that the mill produced its first pulp in December, 1919, and that late in 1920 began the manufacture of rayon pulp; that the Thorne bleaching tower and the multiple stage Thorne bleaching system resulted from Dr. Thorne's desire to improve on the methods employed in pulp bleaching; and that the multiple stage bleaching system with hypochlorite bleaching liquor in both stages was introduced in the Kipawa mill in 1926.

Further comments of Dr. Heuser related that Dr. Thorne's activities and success have been acknowledged in manifold ways and in various countries; that the Technische Hochschule, Darmstadt, made him an honorary Doctor of Engineering; that the Technical Association of the Norwegian Paper Industry presented him with a diploma covering his appointment as an Honorary Member; and that King Haakon of Norway has knighted him as a Knight Commander of the Royal Norwegian Order of St. Olav.

On behalf of the Executive Committee, Dr. Heuser then presented Dr. Thorne with the TAPPI medal for 1938; and Dr. Thorne with a few brief and fitting remarks expressed appreciation for the added honor which had been bestowed upon him.

D. C. Everest, President, American Paper and Pulp Association, was to have addressed the luncheon meeting, but found it impossible to attend. The meeting, therefore, was completed with the medal presentation.

Film—"Trees and Men"

The only other scheduled activity of the afternoon of the third day of the convention was the showing of a motion picture, *Trees and Men*, by the Weyerhaeuser Timber Company, Longview, Washington. This showing was very interesting, particularly to those unfamiliar with logging practices on the Pacific Coast. It not only was educational, but inspirational as well.

Last Day's Sessions

Two group meetings were scheduled for both the morning and afternoon sessions of the fourth and concluding day of the convention.

The morning session included a Paper Manufacture group meeting with George D. Bearce as Chairman; and a group meeting on Alkaline Pulping and Materials of Construction, over which H. R. Murdock and J. A. Lee were scheduled to preside.

The program of the group meeting on Paper Manufacture called for the presentation of five papers, the first two of which were papers by C. E. Macklem, Sales Engineer, Beloit Iron Works, Beloit, Wisconsin.

Paper Machine Presses

The subject of Mr. Macklem's first paper was *Results of Beloit Horizontal Dual Presses Operating on Various Grades of Paper*. It was stated in this paper that the Beloit Horizontal Dual Press originally installed on sulphite, book and bond papers at Niagara Falls is now in successful operation on practically every grade of paper from coast to coast; that at present there are sixteen of these presses in operation and a dozen are in process of construction; that one of the earlier horizontal dual press installations was made at the Monarch Division of Allied Paper Mills, Kalamazoo, Michigan; and that the operators at this mill credit the installation with an increase in production of about 15 per cent.

Mr. Macklem added that there is a Beloit Horizontal Dual Press at the Otsego Falls Paper Company making a very good grade of strawboard; that a comparison of power consumption figures before and after horizontal dual press installation shows a monthly saving of approximately 4500 k.w. in the mill of the Flambeau Paper Company; that the Longview Fibre Company has a Beloit Horizontal Dual Press on a machine making kraft wrapping and butcher paper together with various sulphite wrapping, bag paper, and toweling; that Consolidated Water Power and Paper Company have a horizontal dual press operating on one of the new machines at Wisconsin Rapids making its very successful machine-coated paper; that Nekoosa-Edwards Paper Company are operating a horizontal dual press on its No. 3 machine in the Nekoosa mill; that Kimberly-Clark Corporation has one horizontal dual press in operation and two are scheduled for installation in near future; that Rhinelander Paper Company recently installed a horizontal dual press in its No. 5 machine operating on glassine and greaseproof papers; that Paterson Parchment Company is making parchmentizing stock with one of these horizontal dual presses; that Oxford Paper Company, Rumford, Maine, has one of the presses and a second unit is being built for it; that Thilmany Pulp and Paper Company has a horizontal dual press in operation on kraft papers; that Gulf States Paper Company has another; that two of these presses are operating on 212 inch fourdrinier machines in the Georgetown mill of Southern Kraft Corporation; that there will be two more of them in the new Springhill mill of Southern Kraft Corporation and another is scheduled for one of its other southern mills; and that one will be installed in the new machine of the St. Joe Paper Corporation.

Operation of the press was illustrated through the showing of motion pictures.

New Wire Arrangement

The second paper by Mr. Macklem was entitled *New Method of Applying a Wire to a Beloit Removable Fourdrinier*. This paper revealed that the purpose of the new wire arrangement is to simplify the operation, thus reducing the non-productive machine time required to change a wire and to eliminate any possibility of damaging the wire during this operation; that the new arrangement enables the machine to remain in production while the wire is strung in the aisle, if desired; that many changes have taken place in the wire carriage and that the new arrangement is particularly adapted to the wire machine having extremely long wires as the wire bundle would be very heavy and difficult to handle while unreeling over the wire pit with the older arrangement.

Formation on the Cylinder Machine

Philip Goldsmith was the contributor of the third paper on the program of the Paper Manufacture group meeting.

His subject was *Cylinder Machine Formation*, and in discussing it, he said, in part, that most cylinder vats in service may be considerd as being either of the counterflow or of the overflow type; that the counterflow type feeds its stock in a direction opposite to the direction of rotation of the mold; that stock flows in the same direction as that of mold rotation in the overflow type; that the operating variables of a vat are: difference in levels inside and outside the mold, outside vat level (whether vat is being run high or low) and, in case of overflow vats, stock velocity around the mold; that mold head (other conditions remaining constant) varies directly as the square of the quantity of water drained through the mold; that if the stock is not changed, the mold head required to drain a given quantity of water varies directly as the weight or thickness of the sheet being formed; that on most grades, an excessive mold head will produce a characteristic blotched appearance, especially on reasonably slow stocks; that, in the case of overflow vats, the best formation is obtained by keeping the stock velocity over the making board the same as in the beginning of the vat circle; that the counterflow vat does not allow any control of the speed of the stock flow with relation to the mold; that machines that are running at speeds where their consistencies are high can usually improve formation and tests by slowing down; that, on most grades of board, a consistency of about 0.25 per cent should be aimed at; that stock must arrive at forming point with exactly the same consistency and also exactly the same velocity at every point across the width of the machine; that fittings which are intended to spread the flow across the machine should be designed to treat the stock as gradually as possible; that two things to remember about mixing are that separate flows can best be mixed when their cross sectional areas are small and their velocities high at the point of joining and also that any discharges should be submerged to prevent entrainment of air; that the headbox serves the dual purpose of air removal and of furnishing a steadying surface for feeding the vat; that a vat is no better than its circulation, and a sheet is no better than the formation which results from circulation within the vat; that the ideal vat is a vat which, as a result of prior study, incorporates in its design the factors necessary to make the range of sheets desired; that pumps must be able to deliver a steady output and have sufficient capacity for the most extreme conditions of flow expected; that the whole system be arranged for easy wash up; that it is an observed fact that stock consistency in a counterflow vat is higher where formation starts than at the inlet; that it is also true that the circulating stock after passing around the mold of an overflow vat has a higher consistency than the stock at the inlet; that for all practical purposes, in his opinion, all drainage surface is effective and increased drainage can be expected in proportion to increased drainage surface; that mold diameters have increased from two and one-half feet to three feet to three and one-half feet to four feet to five feet; that an eight-foot diameter mold will allow a speed up to 620 f.p.m.; that the drainage surface is doubled by doubling the mold diameter but the white water area is increased four times; and that many machines are operating with a maximum flow of about 5,000 g.p.m. and at least one with a total capacity of 8,500 g.p.m.

Papers on Metal Covered Rolls and Cost Engineering

Metal Covered Rolls for Paper Machines, by Charles Watson, was the subject of the fourth paper on the program of the group meeting on Paper Manufacture; while the fifth and concluding paper, a paper entitled *Operations—Cost—Sales* was the subject of Dr. John P. Hagenauer, Engineer, American Paper and Pulp Association.

The purpose of Dr. Hagenauer's presentation was to show how closer understanding and co-operation between operating, cost, and sales departments can be promoted through simple application of cost engineering.

Dr. Hagenauer explained, in order to determine if a paper can be produced at a profit, that the expected profit, the raw material cost and every other expenditure not covered by the paper machine conversion cost must be deducted from the quoted price f.o.b. mill and that the residual is the amount of money for which the paper must be produced on the paper machine. He said that the paper machine conversion cost per ton equals the hourly conversion cost divided by the production per hour in tons; and added, after illustrating a typical application, that specifications for a given grade of paper must be such that it can be run within a given speed range; that the trim of the paper must be as close to the maximum as possible and must not fall below a given minimum, if the quoted price is to yield a decent profit to the mill; that the paper ordered must be run within definite speed limits; that the per cent down time must be as low as possible and must not exceed a given maximum; that the amount of broke must be kept to the minimum if the price being received for the paper is to yield the predetermined profit to the company; and that all of these facts are hidden in the figures compiled by the cost department regularly and are ready to be used in the files of the mills.

Alloy Steel Materials Discussed

The first paper on the program of the Alkaline Pulp and Materials of Construction Meeting was a paper by John H. Faunce, Jr., Markets Development Division, American Rolling Mills Company, Middletown, Ohio, on *Alloy Steel Materials of Construction for Pulp and Paper Mills*. The paper, confined to the sulphate industry, revealed that some of the mills have experienced pitting in their plate digesters, particularly around the welds, that an 18-8 stainless steel liner of ⅛ inch plate has proven very satisfactory for combating the corrosive and abrasive action encountered in the bottom of the digesters; that the lining is placed in the lower part of the cone and extends to the steam inlet; that the tendency of mills seems to be toward corrosion and abrasion resistant metals for diffuser bottom perforated screens; that stainless steels of the 18-8 type are proving very satisfactory for condenser and evaporator tubes; that in practically all cases where stainless steel is used, it is either an 18-8 type or an 18-8 S Mo, which is a modification of the standard analysis with molybdenum added; and that there is a wide range of alloy steels from which to choose, as well as many other basic types of metals that might be considered comparable. It also suggested that a group be set up to work with the Materials of Construction Committee of TAPPI to study the applications of ferrous metals and alloys in the industry.

Report Supplement to Faunce's Paper

James A. Lee, Chairman of the Materials of Construction Committee, followed on the program with a *Committee Report of Construction Materials Used in Kraft Mills*. This report was included as a supplement to the paper of Mr. Faunce.

Recausticizing and Lime Recovery

The third paper on the Alkaline Pulping and Materials of Construction program was a presentation by J. P. Rubush, chemical engineer, Swenson Evaporator Company, Harvey, Illinois, on *Recausticizing and Lime Recovery at Bogalusa*. Mr. Rubush related that the new continuous recausticizing and lime recovery system at Gaylord Container Corp., Bogalusa, Louisiana, has been in operation for several months and definite operating conditions have been established; that the conditions of capacity were established at 310 tons of pulp per twenty-four hours with a maximum production of 350 tons of pulp daily; that, based on chemical requirements, the quantity of white liquor was calculated to be 100 cubic feet per ton of pulp; that departing from the conventional, agitated causticizing tanks, usually heated by steam coils, a three-section horizontal reaction unit is employed with gravity flow between the units installed at different levels; that each section is equipped with a slowly-moving spiral ribbon agitator; that the heating is done through ⅝ inch steel side walls by individually controlled steam jackets and no steam coils are required; that separation of the white liquor from the sludge is accomplished by a combination thickening and filtering operation; that the thickener employed is a single compartment unit, fifty feet in diameter; that the thickened sludge

is pumped to a surge tank and from there is fed to the primary filters without dilution; that two rotary vacuum filters, each of eight foot diameter by ten foot face, are installed for this service and provide a generous excess of capacity; that the cake from the primary filters runs from 57 to 62 per cent total solids, averaging about 60 per cent total solids, which is equivalent to 53 per cent undissolved solids; that the filtrate from the primary filters, returned to the settler for clarification, contains about 0.25 to 0.50 per cent suspended solids, but only clear liquor from the clarifier is overflowed to the white liquor storage tanks; that the cake is repulped at the filters with water and is discharged to a surge tank from where the slurry is pumped to secondary filters; that existing sludge recovery equipment consisting of four small rotary vacuum filters and two rotary kilns, is used for secondary sludge washing and lime reburning; that a new kiln, eight feet in diameter by one hundred and twenty-five feet long, of welded construction, was installed; and that the results of the lime reburning have averaged from 86 per cent to over 90 per cent available calcium oxide and for several periods have averaged equal to or better than the available calcium oxide in purchased lime.

Recausticizing Control

How to Control the Continuous Recausticizing System, the next paper on the program, was the subject of C. L. Knowles, Chemical Sales Director, The Dorr Company, Inc., New York, N. Y. Mr. Knowles stated that the purpose of his paper was to suggest practical ways and means for the operator of a continuous recausticizing plant to control the entire system and maintain it at maximum efficiency day in and day out. Control, he said, cannot be done on a hit and miss basis—this means proper metering equipment, proper feeders, correct temperature control and a systematic routine for the taking of samples and the carrying out of the analytical work. Likewise, he added that the control apparatus must be simple, the sampling routine not too arduous, and the analytical work elementary so that it can be done accurately at a bench in the recausticizing room by a man possessing no more than a grammar school education.

The paper included a rather extensive discussion of control apparatus together with suggestions on sampling and some notes on simple analytical procedures.

Digester Blowdown Systems

The group meeting on Alkaline Pulping and materials of Construction was completed with a paper by Pell W. Foster, Jr., Manager, Industrial Division, Foster-Wheeler Corp., New York, N. Y. Mr. Foster first pointed out that over fifty per cent of the heat required in a digester cook can be recovered from the steam flashed off the digester during the blow. Then he called attention to arrangements utilizing either a surface type condenser or jet condenser for such an application. The most simple one from the point of view of equipment required, he said, is the one using a surface type condenser. He likewise added that when the pressure in the digester is relieved, the mixture of steam and turpentine vapors may be withdrawn and condensed; that there is a heat loss in steam of 900,000 b.t.u. in relieving the pressure of an eight ton digester from 110 to 100 pounds that can be recovered; that it has been found in practice that 1½ to 2 gallons of turpentine can be recovered from each ton of pulp produced; and that a certain amount of heat lost in the blowdown is at sufficient temperature head to be recovered in the form of twenty-five pounds gauge steam by the use of Ruth's accumulator. He illustrated and described three different arrangements of such a recovery system. In the case of any one of the three arrangements, the digester finally blows down at fifty pounds pressure to a diffuser.

Concluding Sessions

The group meetings of the afternoon session of the fourth and concluding day of the convention included a Paper Testing meeting and a meeting on Heat and Power. The Paper Testing meeting was in the form of a symposium on testing the printing smoothness of paper; while the program of the meeting on Heat and Power included the presentation of six papers.

Electric Power Supply Systems

Analysis of Electric Power Supply System for Pulp and Paper Mills was the subject of the first paper on the Heat and Power program. It was a paper by H. A. Travers, engineer, Switchgear Division, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

Mr. Travers stated early in his paper that the selection of suitable switchgear equipment for any particular requirement may vary considerably in detail, but certain fundamentals should always be borne in mind. These fundamentals, he continued, may be set forth in approximately the following order of importance:

(1) The switchgear should not subject the attendants to undue hazards even under abnormal conditions ensuing from electrical failure of apparatus or circuits.

(2) The arrangement should provide for the economic operation of apparatus—permit the use of machines, transformer or lines in such a manner as to secure maximum system efficiency.

(3) Simplicity should be the guiding point in the layout of the switchgear. Unnecessary complications tend to confuse operators and cause unduly high installation and maintenance costs.

(4) Co-incident with simplicity, there should be that degree of flexibility which will permit such continuity of operation as may be commensurate with the class of service to be rendered. Some circuits may require duplication where continuity of power supply is of prime importance, when other circuits may not require such treatment.

(5) The various elements entering into the make-up of the electrical system should be rugged and reliable. The physical arrangement should be such as to facilitate operation, inspection, maintenance and extensions. At the same time, it should have that degree of symmetry requisite to creditable appearance.

Continuing his comments, Mr. Travers said that every electrical system may be divided into three major components, generation, distribution, and load apparatus; that the impedance of these three components are quite definite for any normal load condition and determines the amount of power flow from the generators to the load; and that it naturally follows that the impedance of the distribution system should be as low as possible in order to obtain good voltage regulation at the load points and minimize distribution losses.

Mr. Travers also mentioned that circuit breakers are rated according to the following:

(1) Maximum voltage at which the breaker can be operated.

(2) Maximum continuous current with respect to a definite temperature rise.

(3) Maximum r.m.s. current which the breaker will carry for any time, however small, up to a time of one second.

(4) Maximum r.m.s. current which the breaker will carry for five seconds.

(5) Interrupting current ratings—(a) at rated voltage, (b) maximum current limit.

(6) Time for energizing trip coil with normal voltage until circuit is interrupted at 25 per cent to 100 per cent of interrupting rating.

Prevention of Fly Ash

Stanley Brown, Buell Engineering Company, 70 Pine Street, New York, N. Y., was on the program for the presentation of the second paper. His subject was *Fly Ash Prevention*.

It should be recognized, stated Mr. Brown, that, if dust has value, its total collection is of importance; whereas, if it is merely an annoyance, a character of elimination should be employed which will best correct the nuisance range. Nuisance, he added, depends upon particles sizing, combustible content, and the falling of the ash upon residences, business establishments and factories. The combustible content, said Mr. Brown, increases with particle size and therefore the upper sizings are doubly troublesome.

In the selection of an eliminator, continued Mr. Brown, it is hazardous to predicate results upon the findings of polished laboratory models or experimental sizes upon the roof because vast difference may be disclosed in the operation of large size eliminators in the

matter of gas distribution, control at fractional load, temperature strains, ash accumulation, as well as relative accuracy.

Mr. Brown then called attention to the Buell eliminator (van Tongeren system); described it in some detail; stated that an unusual characteristic of the eliminator is that its efficiency increases with light dust loadings and this is of great importance in the realm of fly ash.

Of concluding interest, commented Mr. Brown, the guarantee as here tabulated, while distinctly conservative with reference to the design, is more than fully protective to the station.

Microns	Mesh	Collection Efficiency—Per Cent
Above 44	325	97
Above 20	625	90
Above 10	1250	80

Boiler Feedwater Treatment
Air Conditioning Systems

The third paper on the program a paper by Sheppard T. Powell, was on the subject of *Boiler Feedwater Treatment*. It was followed by a paper on the *Present Status of Air Conditioning Practice*. This latter paper was the contribution of V. P. Victor, Engineer, J. O. Ross Engineering Corporation, New York, N. Y.

The purpose of Mr. Victor's paper was three-fold: first, to outline the fundamental principles underlying the design of various types of air treating systems; second, the present basic methods and equipment items with their respective cycles; and third, to describe representative installations and their performance.

Properly designed industrial air systems, related Mr. Victor, have to embody means to meet all or some of the following major requirements:

1. Maintenance of certain temperatures and humidities within given tolerances.
2. Positive control of air movement and distribution in order to produce necessary effects or changes in the product or the space proper.
3. Proper ventilation, various degrees of air cleaning and purification.

Mr. Victor suggested that the equipment of an air system can be divided into three parts—air treating, conveying and distributing apparatus; refrigerating equipment and sources; and controls.

In describing the equipment used for the treating, conveying and distributing of air, he stated, in part, that the problems encountered in the design of air conditioning or treating equipment involve mostly heat transmission data and practice; that, essentially, there are two types of heat exchange apparatus, namely—indirect and direct; that the absorption equipment usually consists of a scrubber (viscous filter) or an air washer with wetted surfaces; that direct spraying or atomizing of water in the room is satisfactory for increasing humidity, but great care must be exercised in designing, controlling and maintaining the equipment in proper shape; that air cleaning is performed by means of air filters; that air distributing means consist of all sorts of special nozzles, outlets, deflectors, and grilles.

After outlining in some detail the commonly known and used methods, materials or cycles for refrigerating, Mr. Victor called attention to two main classes of controls—self-contained thermostats and valves where the power for the operation of the valve is derived from the expansion and contraction of the media in the thermostatic element; and relay type thermostats which derive their action from the expansion and contraction of the media in the element, but the power for the operation of controlled devices comes from an external source, such as compressed air, electric current, hydraulic pressure, etc. He then touched upon representative installations and in this connection made reference to paper and textile laboratories, dough fermentation rooms, gravure plates departments, and product cooling.

A Paper on Drying

How Much Do We Know About Drying? a paper by F. C. Stamm, Consulting Engineer, Lockport, N. Y., was next on the program for presentation.

Air and steam, commented Mr. Stamm, are two gases and as such will mix together the same as oxygen and nitrogen. Once they are mixed, he added, the only way to separate them is to condense the steam, thus leaving the air by itself.

Mr. Stamm also related that, in the average dryer, operating at speeds of over 300 feet per minute, the condensate is carried up the side and, as it breaks and falls back to the bottom, it creates a regular rainstorm. This turbulence, continued Mr. Stamm, increases with higher speeds and it is thus hard to visualize how any stratification could exist under such conditions. Air, he emphasized, does not settle to the bottom—it stays mixed with the steam and will thus remain until it is removed.

A 10 per cent concentration of air in a dryer, according to L. D. Tatley (*Paper Trade Journal*, April 7, 1927), said Mr. Stamm, will reduce heat transfer about 35 per cent. In addition, he said that there are mills where the air carried over with the steam is negligible; and there are others where it will cause considerable annoyance if not properly removed.

Mr. Stamm also called attention to an instrument which not only indicates and records the presence of air, but will also automatically remove it from the system. The instrument, he said, consists of two recording elements, one a thermometer element which responds to the actual temperature in the dryer, and the other a pressure sensitive element which responds to changes in pressure in the dryer but which is so calibrated that it reads the theoretical temperature. Thus, when the instrument is in operation, the pressure element records the temperature as it should be, and the temperature element records the temperature as it actually is. Any difference between the two pens indicates the presence of air.

In concluding his remarks, Mr. Stamm cited the need for further research in the subject of drying, and commented that, if the work was to be free of prejudice and accurate as to facts, it should be accomplished through TAPPI.

Moisture Control Systems

The program of the group meeting on Heat and Power was concluded with a paper entitled *A Resume of Moisture Control Systems*. This paper was presented as a contribution of the TAPPI Drying, Heating and Ventilating Subcommittee of which L. G. Green, of A. P. W. Paper Company, Albany, N. Y., is chairman.

The report listed the following moisture indicating mediums as being in use at present—(1) tension roll—expansion and contraction of the sheet, (2) humidity of the sheet, (3) temperature of the sheet, and (4) work done by sheet.

It also stated that the tension roll method of indicating moisture is based on the fact that a sheet expands and contracts with changes in moisture content; that some of the outside variables which may effect this type of control, aside from moisture are: changes in speed of machine, in degree of hydration, in mechanical draw or tension, in formation—and wide variations in weight across the sheet; that the humidity of the sheet method of indicating moisture is based on the theory that the humidity of the air film next to the sheet quickly equalizes with the humidity of the sheet itself; that some of the outside variables which may effect this type of control, aside from moisture are: changes in sheet temperature as it passes control point, in machine speed, in machine ventilation (temperature and humidity)—condensation within sampling box, and wide variations in weight across the sheet; that the theory on which the temperature of the sheet method of indicating moisture is based on the fact that the temperature of the sheet slowly increases as the moisture content decreases; that some of the outside variables which may effect this type of control, aside from moisture, are: speed of the machine, variations in machine pressure, degree of hydration, changes in machine ventilation (vapor pressure), and wide variations in weight across the sheet; that the work done by sheet method of indicating moisture is based on the fact that the work done by any individual dryer is in direct relation to the moisture content of the sheet as it passes over that dryer; and that some of the outside variables which may effect this type of control, aside from moisture, are: speed of machine, variations in tension or draw, changes in sheet temperature, and wide variations in weight across the sheet.

The report likewise briefly described, in the order given, the Pickles Automatic

Drying Regulator, the Stickles Moisture Control, the Taylor-Witham Control, the Foxboro Verigraph Moisture Controller, the American Askania Control, and the Mason-Nielan Moisture Control. A reference also was included to the effect that the Brown Instrument Company has been doing considerable research work on the problem of moisture control and expects to be able to announce something of interest in the near future.

Festivities

Although the completion of the afternoon meetings on the fourth day of the convention brought it to a close, it is only fitting that recognition be given to some of the outside activities which were arranged for the enjoyment of TAPPI delegates and guests.

There was the Savannah TAPPI Reunion, for example, which was held on the evening of February 22 at the Belmont Plaza Hotel. It was a social affair that brought together for a few hours of relaxation and friendly comradeship many of those who were privileged to attend the 1937 fall meeting in Savannah, Ga.

Then, too, there was the invitation of E. I. du Pont de Nemours and Company to attend the February 23 broadcast of "The Cavalcade of America." This invitation proved enticing and several hundred of those attending the convention took advantage of it. The feature of the broadcast was Noah Webster, the Nation's Schoolmaster. Not only was the theme of the broadcast interesting, but equally so was the opportunity of seeing just how it was done. The invitation of du Pont to attend this broadcast was just another proof of du Pont's desire to fulfill its slogan—"Better Things for Better Living . . . Through Chemistry."

Meetings of Divisional Bodies

Writing Paper Manufacturers Association

The seventy-seventh annual meeting of this body was held in the Jansen Suite of the Waldorf-Astoria Hotel on February 22 in conjunction with the sixty-first annual convention of the American Paper and Pulp Association. R. S. Madden, of the American Writing Paper Company, Inc., Holyoke, Mass., was re-elected president of the Writing Association for the ensuing year, and Morris C. Dobrow was elected executive secretary.

At the meeting, Emmet Hay Naylor, who for 24 years had been secretary of the Writing and Cover Associations, resigned to retire from active business. Mr. Naylor, one of the most widely known trade association secretaries in the country, became associated with the Writing Paper Manufacturers Association in 1914 as secretary and treasurer, and built the association up to its present importance in the industry. He has written several books on trade association work, and was instrumental in organizing the Trade Association Executives in New York City, of which he was the first president. Horace A. Moses, of the Strathmore Paper Company, and Walter J. Raybold, of the Rising Paper Company, both delivered eulogies on Mr. Naylor's distinguished service to the writing manufacturers association. Mr. Dobrow, who succeeds Mr. Naylor, has been with the writing and cover paper groups as treasurer and as assistant to Mr. Naylor for 22 years.

The Rag Content Group of the Writing Paper Manufacturers Association elected A. C. Gilbert, president of the Gilbert Paper Company, Menasha, Wis., as group chairman. The following were chosen to compose the group's Executive Committee: H. H. Hanson, president of W. C. Hamilton & Sons, Miquon, Pa.; L. E. Maglathin, general manager of the Keith Paper Company, Turners Falls, Mass.; W. C. Wing, Jr., treasurer of the Fox River Paper Company, Appleton, Wis., and J. D. Zink, vice president of the Strathmore Paper Company, West Springfield, Mass. With Mr. Gilbert, the Executive Committee members become members of the Executive Committee of the Writing Paper Manufacturers Association.

George P. Lee, vice president of the Eastern Manufacturing Company, Bangor, Me., was elected chairman of the Sulphite Bond Group of the Writing Paper Manufacturers Association, and elected to serve with him on the Executive Committee were: H. H. Baldwin, vice president of the Hammermill Paper Company, Erie, Pa.; H. F. Harrison, sales manager of the West Virginia Pulp and Paper Company, New York; H. A. Legge, general manager of the Howard Paper Company, Urbana, O., and F. Henry Savage, manager of the book and bond division of the International Paper Company, New York. The entire Committee will serve as members also of the Executive Committee of the Writing Paper Manufacturers Association.

Cover Paper Manufacturers

The Cover Paper Manufacturers Association at its annual meeting in the Jansen Suite of the Waldorf on February 22 accepted the invitation of the Writing Paper Manufacturers Association to become a group of that Association. Under the consolidation plan, Guy H. Beckett, of the Beckett Paper Company, Hamilton, O., was elected a member of the Executive Committee of the Writing Paper Manufacturers Association. The Cover Paper Executive Committee was re-elected, as follows: Mr. Beckett, chairman; A. E. Frampton, Hammermill Paper Company; F. E. May, Rising Paper Company; D. T. Quirk, Peninsular Paper Company, and W. J. Warner, The Marvellum Company.

Newsprint Manufacturers

Arthur L. Hobson, of the St. Croix Paper Company, was elected chairman of the Association of Newsprint Manufacturers of the United States at the annual meeting in Le Perroquet Y of the Waldorf-Astoria on February 23. J. D. Zellerbach, of the Crown Zellerbach Corporation, and Samuel Pruyn, of Finch, Pruyn & Co., Inc., were elected vice chairmen, and the following Advisory Committee members were elected: E. L. Crooker, International Paper Company; John H. Smith, Hawley Pulp and Paper Company; Harold S. Smith, Maine Seaboard Paper Company, and R. H. M. Robinson, Minnesota and Ontario Paper Company. Mr. Pruyn was formerly a member of the Advisory Committee (during 1937) and John H. Smith was the newly elected member of the Committee. The other officers and members of the Advisory Committee were re-elected.

Kraft Paper Association

The Kraft Paper Association at its annual meeting on February 23 in the Waldorf-Astoria re-elected William H. Anders, president of the Nashua River Paper Company, as president for the ensuing year, and also re-elected Norman S. Stone, of the Mosinee Paper Mills Company, vice president. The Executive Committee chosen includes these two officers and J. M. Arndt, Gaylord Container Corporation; J. A. Auchter, Nekoosa-Edwards Paper Company; D. P. Brown, The Brown Company; J. H. Cowhill, Tomahawk Kraft Paper Company; H. S. Daniels, Union Bag and Paper Corporation; E. R. Gay, St. Regis Paper Company; W. J. Henry, Southern Advance Bag and Paper Company; R. A. McDonald, Crown Zellerbach Corporation; J. R. Miller, West Virginia Pulp and Paper Company, and J. L. Stille, Southern Kraft Corporation. S. M. Hudson was again named secretary-treasurer of the Association.

The meeting listened to reports of developments of the past year, including a graphical presentation based upon comparisons of statistical data for 1937 with previous years and with other industries. Plans were then formulated for activities in the new year. The business meeting was followed by an informal luncheon.

U. S. Pulp Producers Association

A well attended meeting was held on the afternoon of February 21 in Pillement GH of the Waldorf by the United States Pulp Producers Association, at which Amor Hollingsworth, president of the Penobscot Chemical Fibre Company, Great Works, Me., was re-elected president for the ensuing year; R. B. Wolf, general manager of the Pulp Division of the Weyerhaeuser Timber Company, was elected vice president, and Oliver M. Porter, of New York, was again chosen secretary and treasurer. A luncheon preceded the meeting.

Tissue Paper Manufacturers

With Chairman C. Alfred Wagner, of the Stevens & Thompson Paper Company, presiding, the Interfold Tissue Division of the Tissue Association held an interesting and well attended meeting on February 21 at the Waldorf-Astoria Hotel. The chairman reviewed conditions in the industry. Results of the statistical program released in January were reviewed and approved. Trade customs and standards were reviewed, tightened up, and a standing committee appointed for further study. The committee appointed consists of Wayne Brown, National Paper Products Company; Henry Wintgens, Hoberg Paper and Fibre Company, and Bert Reider, Victoria Paper Mills. Roger Bell, of the A. P. W. Paper Company, was elected chairman of the Division for the ensuing year, and Grafton Houston, of the Fort Howard Paper Company, was chosen co-chairman. The new Executive Committe is composed of Robert J. Black, Morgan Paper Company; C. A. Wagner, Stevens and Thompson Paper Company; Wayne Brown, National Paper Products Company, and Bert Reider, Victoria Paper Company.

Co-Chairman Henry G. Wintgens, of the Hoberg Paper and Fibre Company, presided at the annual meeting of the Roll Toilet Division of the Tissue Association, at which standards and trade customs were reviewed and referred to a committee to be appointed. It was the consensus of opinion that the mills would continue their policy of accepting business for 30-day shipment only. The group expressed interest in plans proposed to introduce model marking and labelling laws in the various State Legislatures to cover toilet tissue. The group also was favorable to investigating the possibilities of using certified quality labels on products produced by its members. This was referred to a committee for recommendation at the next meeting. Bert Reider, of the Victoria Paper Mills, was elected chairman, and Wayne Brown, of the National Paper Products Company, co-chairman. The following were chosen to comprise the Executive Committee: Milan Boex, Northern Paper Mills; C. A. Wagner, Stevens and Thompson Paper Company; I. Wood; G. Houston, Fort Howard Paper Company; S. Wishnick, Park Tissue Company; S. Lopin, Mazer Paper Mills; B. Picola, Gotham Tissue Company, and A. Ginsburg, M. A. King Company.

The Wrapping Tissue Division of the Tissue Association, heard a report on the activities of the Division for the year by Chairman Howard Larsen, of the Crystal Tissue Company, who presided at the annual meeting. The wrapping tissue guaranteed label program was reviewed and a further program of promotional effort was referred to the Executive Committee for recommendation. The statistical program was reviewed and it was reported that 85 per cent of the industry's tonnage was represented in the reports issued. The problem of small orders was thoroughly discussed and a program adopted. W. E. McIntyre, of the McIntyre Bros. Paper Company, was elected chairman for the ensuing year, and Arthur Duggan, of the Consolidated Water Power and Paper Company, co-chairman. H. R. Telfer, Detroit Sulphite Pulp and Paper Company; Sam Lopin, Mazer Paper Mills, and Howard Larsen, Crystal Tissue Company, were elected to compose the Executive Committee together with the chairman and co-chairman. Harold A. Edlund was re-elected secretary of all three divisions of the Tissue Association.

The general meeting of the Tissue Association elected the following as a Board of Governors for the coming year: Milan Boex, Northern Paper Mills; Joel Hartman, Barclay Tissue Corporation; Grafton Houston, Fort Howard Paper Company; Howard Larsen, Crystal Tissue Company; Samuel Lopin, Mazer Paper Mills; Benjamin F. Picola, Gotham Tissue Corporation; George Stuhr, Southern Kraft Corporation; C. Alfred Wagner, Stevens and Thompson Paper Company, and Frank Vaughn, Bay West Paper Company. The Board elected Mr. Wagner president of the Association for the ensuing year, Messrs. Stuhr and Vaughn vice presidents, Mr. Picola treasurer, and Mr. Edlund secretary. One of the features at the general meeting was the showing of a motion picture, "Employe Relations and Opinion," sponsored by the National Association of Manufacturers.

Sulphite Paper Manufacturers

Featured by an address by American Paper and Pulp Association President D. C. Everest, the meeting of the Sulphite Paper Manufacturers Association in the Carpenter Salon of the Waldorf on February 21 was largely attended. Harold O. Nichols, of the Crown Zellerbach Corporation, was re-elected general chairman, and the following vice-chairmen were also re-elected: Bleached Group, Rufus I. Worrell; Unbleached Group, E. Stuhr; Manila Group, R. L. Sisson, Jr., and M. G. Sulphite Group, Edgar W. Kiefer. W. B. Merlin, J. E. Alexander, J. L. Stevens, Jr., L. F. Porter and Aubrey Crabtree were elected to the board, and Thomas J. Burke, New York, was renamed secretary and treasurer. In addition to President Everest, Isadore Zellerbach addressed the meeting.

Groundwood Paper Manufacturers

Succeeding C. H. Sage, of the Kimberly-Clark Corporation, Neenah, Wis., J. H. Coy, of the Flambeau Paper Company, Park Falls, Wis., was elected president of the Groundwood Paper Manufacturers Association at the annual meeting of that group, and W. C. Shorter, International Paper Company, was elected Eastern vice president, and R. O. Warner Western vice president. These three officers together with Thomas Farwell from the East and George H. Fay from the West compose the Association's Board of Governors for 1938.

Bristol Board Manufacturers

All officers were re-elected by the Bristol Board Manufacturers Group at its annual meeting on February 22 in Le Perroquet Y of the Waldorf-Astoria. Rufus I. Worrell, of Wheelright Papers, Inc., and the Mead Sales Company, Inc., was again named chairman; James B. Ramage, of the Franklin Paper Company, vice-chairman, and James L. Ritchie, secretary-treasurer. These officers and Norman Harrower, Linton Bros. Paper Company; J. E. Holmes, Chemical Paper Manufacturing Company; Rolf G. Westad, Waterfalls Paper Company, and James L. Ryland, Standard Paper Company, comprise the Executive Committee.

Blotting Paper Manufacturers

Re-electing W. W. Langtree, of the District of Columbia Paper Mills, Inc., Washington, D. C., as chairman, and Henry S. Mead, of the Wrenn Paper Company, Middletown, O., as vice-chairman, the Blotting Paper Manufacturers Association held an interesting annual meeting at which reports of committees were rendered and various topics discussed. James L. Ritchie, of New York, was again named secretary and treasurer of the group.

Cardboard Manufacturers

J. B. Van Horn, of the Holyoke Card and Paper Company, Springfield, Mass., who previously was vice president for two years of the Cardboard Manufacturers Association, was elected president of that organization at its annual meeting on February 23, succeeding Kendall Wyman, of the Champion Paper and Fibre Company, Hamilton, O., who also for two years headed the Association. Malcolm Lowe, of the Lowe Paper Company, Ridgefield, N. J., was elected vice president, and James L. Ritchie, of New York, was re-elected secretary and treasurer.

Glassine and Greaseproof

The Glassine and Greaseproof Manufacturers Association in annual session at the Waldorf-Astoria on February 23 elected Paul E. Hodgdon, of the Deerfield Glassine Company, Monroe Bridge, Mass., chairman for the ensuing year, succeeding Folke Becker, of the Rhinelander Paper Company, Rhinelander, Wis., who had served two terms as chief executive of the Association. H. B. Kuhns, Nicolet Paper Corporation, De Pere, Wis.; Paul F. Moore, Westfield River Paper Company, Russell, Mass., and retiring chairman Becker were elected to the Execu-

tive Committee, while Robert F. Nelson, Glassine Paper Company, and John L. Riegel, Riegel Paper Corporation, were re-elected Committee members for another year. Thomas J. Burke, of New York, was again named secretary-treasurer.

Gummed Industries Association

Henry W. Stork, of the Rexford Paper Company, Milwaukee, Wis., was elected president, and R. A. Maish, of the Dennison Manufacturing Company, Framingham, Mass., vice president of the Gummed Industries Association at the annual meeting and luncheon of that group in the Waldorf-Astoria on February 24. These officers and the following comprise the new Executive Committee: John MacLaurin, MacLaurin-Jones Company, Brookfield, Mass.; J. R. Carter, Nashua Gummed and Coated Paper Company, Nashua, N. H.; Joseph Mazur, Hudson Bag Company, New York City; W. K. Gerbick, Central Paper Company, Menasha, Wis., and Irving McHenry, Mid-States Gummed Paper Company, Chicago, Ill.

Glassine Bag Association

A well attended meeting was held on February 22 by the Glassine Bag Association, at which President A. B. Kehr, of the Paramount Paper Products Company, presided. The meeting was followed by a dinner, with 36 present. Mr. Kehr was re-elected president, and the following directors were elected: Arthur W. Frank, American Paper Goods Company; Gerald Fox, Oneida Paper Products Company; Gordon Friend, T. M. Royal Company; Fred Zorn, Custom Made Bag Company, and James Duffy, Union Bag & Paper Corporation. Among the speakers at the meeting were Mr. Frank, Mr. Fox, Alfred Bleyer, of Alfred Bleyer & Co.; Mr. Luck, of the Wortendyke Manufacturing Company, and Mr. Friend. Discussion of trade customs was featured with many suggestions for improvements in the glassine bag industry being adopted, among which was the elimination of Sulglass as a material to be used in standard bags, from now on only genuine glassine to be used.

American Waxed Paper Assn.

At the annual meeting of the American Waxed Paper Association on February 21, George J. Lincoln, Jr., was re-elected executive secretary, and the following were elected to the Board of Governors for two-year terms: J. E. Edelstein, Rap-In-Wax Paper Company; A. Schwab, Hamersley Manufacturing Company, Inc.; Robert Fairburn, Berst-Forster-Dixfield Company, and Howard Larsen, Crystal Tissue Company.

Paper Towel Manufacturers

Henry Wintgens, of the Hoberg Paper Mills, Inc., was elected chairman of the Executive Committee of the Association of Paper Towel Manufacturers at the annual meeting of that group in the Waldorf-Astoria. Other members of the Committee elected are Wayne A. Brown, National Paper Products Company; Jack Leo, The Brown Company; George Stuhr, Southern Kraft Corporation; W. F. Campbell, Scott Paper Company; W. M. Watson, Wortendyke Manufacturing Company; Samuel Lopin, Mazer Paper Mills; Harold Peazey, Peazey Paper Products Company; A. J. Marcuse, West Disinfecting Company, and Frank Vaughn, Bay West Paper Company.

Paper Makers' Ad Club

Electing new officers and adopting a change in name, the Paper Makers' Advertising Club entered its twenty-third year of activity at its annual meeting in the Waldorf on February 21. By vote of the membership, the organization will in the future be known as the Paper Makers' Advertising Association. Floyd Triggs, of the Riegel Paper Corporation, New York, was elected president to succeed Orin Summerville, of the Beckett Paper Company. Edson Dunbar, of the Crocker-McElwain Company, was elected vice president for the Eastern section; E. S. Colvin, of the Appleton Coated Paper Company, Western vice president; Maurice A. Park, of the Marvellum Company, treasurer, and Richard A. Faulkner, of the International Paper Company, secretary. William White, of the James White Paper Company, Chicago; Oswald F. Marquardt, of Marquardt & Co., Inc., New York; John Coakley, advertising manager of Thomas A. Edison, Inc., and Irving Simon, of the Macfadden Publications, addressed the meeting.

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◆ Power Equipment For Northern Paper Mills

Power and energy for the new $750,000 steam generating plant of Northern Paper Mills, Green Bay, Wis., will be furnished by two Riley boilers, manufactured by the Riley Stoker Corporation, Worcester, Mass., and two General Electric turbo-generators of 5,000 kilowatt total capacity.

Powdered coal will furnish heat for the plant. Ground finer than flour, the coal will be blown into the firebox by an air jet which will also introduce the necessary oxygen for combustion. Resembling the flame of an oil burner, the powdered coal burns instantly with almost explosive force. Combustion is perfect with almost complete elimination of smoke and ash.

The two-story brick office building at the Northern mills is being moved to a new location some 1,500 feet distant. The building is supported by massive timber cribbing as it is rolled along on heavy steel rollers. This feat of moving the entire building was made necessary to provide room for the new power plant.

◆ New Company Takes Over Bendix Fan Division

The business of the Industrial Fan Division of the Bendix Products Corporation will be conducted by the South Bend Air Products, Inc., South Bend, Ind., which company was recently formed to purchase and continue the ventilating equipment business. The complete line of fans and other equipment is being continued under the trade names, "Dynaflow" and "Aerospot." Marshall A. Smith, Jr., formerly in charge of sales and engineering at the Bendix division, is president and general manager of the recently-organized company.

◆ Savannah Laboratory Reorganizes

On February 28, 1938 the Pulp and Paper Laboratory of the Industrial Committee of Savannah, Inc. became the "Herty Foundation Laboratory" under an act of the recent session of the Georgia legislature. The Laboratory in the past has been supported financially chiefly by The Chemical Foundation, Inc. of New York City and by contributions by the Georgia Legislature and the Industrial Committee of Savannah.

At the close of last year it became known that the major part of the funds supporting the Laboratory would not be available in the future. With this situation foreshadowing the possible closing of the Laboratory an emergency fund was raised by equipment manufacturers under the leadership of Mr. C. Stewart Lee of the Pusey and Jones Corporation of Wilmington, Delaware, sufficient to continue its operation until ways and means could be provided for its permanent financing.

Following this action the Georgia Legislature made an appropriation of $20,000 at its special session in addition to the $10,000 appropriated at the last regular session. These funds, together with the continued contribution by the Industrial Committee of Savannah, insure the financing of the Laboratory for 1938.

For the future, the Georgia Legislature created by special act the Herty Foundation, authorized to take over the equipment and operation of the Laboratory and to receive contributions from other states and sub-divisions thereof, individuals and corporations. The board of trustees of the Foundation is as follows:

Mr. Jas. Fowler, Soperton, Chairman.
Mr. G. M. Bazemore, Waycross, Vice Chairman.
Mr. Elliott W. Reed, Savannah, Secretary-Treasurer.
Dr. Chas. H. Herty, Savannah, Executive Director.
Mr. Harley Langdale, Valdosta.
Mr. G. E. Maddox, Rome.

The past policies and purpose of the Laboratory will be continued, viz. through systematic research to determine with the use of standard papermill equipment and chemicals what modifications are necessary for the use of the fast-growing woods of the Southern States for woodpulp and products manufactured therefrom. As has been customary from its origin, the information developed in the Laboratory will be available to all. It is the purpose of the Laboratory to cooperate with all agencies engaged in this field of work.

Through such studies it is believed that capital will be led to develop mills which will contribute to the welfare of the people of the South and the economic independence of the nation.

Salesmen's Association Roster Reaches Highest Mark

CONTINUING the excellent progress made in its drive for members in the year preceding, the Salesmen's Association of the Paper Industry recruited 31 new members during 1937, bringing the total membership up to 291 individuals, representing 133 mills, at the end of the last calendar year. This was brought out at the annual meeting of the Association held in Suite 4-JK of the Waldorf-Astoria Hotel, New York, on February 22. The present membership is the largest in the annals of the Association.

With President Edson R. Lyman, of the Missisquoi Corporation, New York City, presiding, the annual Salesmen's meeting was well attended. Various committee reports for the year were rendered. Hugh N. Phillips reported as vice president of the Eastern Division; John T. Burruss as vice president of the Western Division; J. K. Hutchison as chairman of the Eastern Membership Committee; H. C Engel as chairman of the Western Membership Committee, and Alan Helfrich as chairman of the Eastern Social Committee. Reports were also read from chairmen of the Western Social Committee, of the Eastern and Western Golf Committee, and of the chairman of the Miami Valley Division.

In his annual report, President Lyman reviewed the trend of business during the past year, particularly within the paper and pulp industry, and emphasized the extremes witnessed in orders, production, etc., during the twelvemonth. He commented at length on the activities of the Association, social and otherwise and both in the East and West, during the year. One salient paragraph in his report stated as follows:

"It would seem that one could predict better conditions ahead. A significant fact is that paper production increased 625,000 tons during 1937 over the record year of 1936, and while most industries are trying to catch up to 1929, paper production in 1937 was 1,560,000 tons in excess of that year. Production last year was 12,600,000 tons. Additional revenue will help the railroads. The additional income to the farmers will get them spending. The Naval program will put many to work. Retail sales have been considerably higher. Let us hope that we can soon forget these chaotic times and that normalcy may reign again."

On motion of George K. Gibson, the secretary was instructed to mail a copy of President Lyman's annual report to each member of the Association.

John T. Burrus, Chicago representative of the Albemarle Paper Manufacturing Company, was elected president of the Salesmen's Association for 1938. Hugh N. Phillips, of the International Paper Company, New York, was re-elected Eastern Vice President, and John I. Diggs, of the Mosinee Paper Mills Company, was elected Western Vice President, succeeding Mr. Burrus. Dr. E. O. Merchant was again named secretary and treasurer.

A rising vote of appreciation was tendered retiring President Lyman for his earnest and efficient work as head of the Association during 1937, and expressions of thanks also were extended to the Eastern and Western Vice Presidents as well as to the annual luncheon committee members.

A record-breaking number of nearly a thousand attended the annual luncheon of the Salesmen's Association in the grand ballroom of the Waldorf-Astoria which immediately followed the Association's annual meeting. Retiring President Lyman presided, and the principal speakers were Gen. Hugh S. Johnson and American Paper and Pulp Association President D. C. Everest. At the luncheon Mr. Lyman was presented a gift of a traveling bag as a token of appreciation of the Association's members for his efforts in their behalf during his term of office.

Gen. Johnson delivered a fiery, typically Johnsonese address at the luncheon. "All that is needed for recovery, without giving up a single one of its great social objectives," he declared, "is for this Government to decide whether it wants a capitalist system based on individual freedom and reasonable gain or some modification of a Socialist, Fascist or Communist system based on government operation of business by a bureaucratic overhead of inexperienced and second or third-rate minds. It can try either, but it can't try both at the same time. They are as contradictory as black and white."

We have an Administration, General Johnson stated, which has not proposed or put into operation since the N.R.A. one single policy, statute or action that is not anti-business—restrictive of the capitalist and profits system—not one single policy or action which does not tend toward the socialistic doctrine of government operation of business of what they call "production for use and not for profit"; not one single action tending toward the encouragement of business but a whole cluster of actions which tend toward its paralysis. Coupled with this, an uninterrupted series of utterances revealing a bitter hostility if not active hot hatred, toward the profits system as such and the American business system in particular.

"Raising the nation's business activity from where it now is—probably 50 billions a year—to where it should be or 100 billions a year would make normal jobs for all our unemployed except the three or four millions who are always part-time or totally unemployed is the only possible solution of our unemployment problem; our only road to recovery," Gen. Johnson said.

"All that is necessary to do that is to step aside and let the American capitalist and profits system work—to do everything to encourage business and spending and investment, instead of doing everything to discourage and deter them—to reverse all these policies of distributing scarcity and poverty and start everything we can think of to distribute abundance and wealth by throwing our system of profits and production into high gear.

"Specifically what?

"Under the anti-trust laws precisely define what it is that business cannot do and permit it to do under government supervision whatever will speed production and employment. Completely revise the tax system to provide maximum revenues until the budget is balanced and thereafter reduce taxation. But get that revenue by abolishing every tax which is not for revenue but for punishment and regulation. Fix rates on the law of diminishing returns, encouraging, instead of confiscating, investment for expansion for capital gains and for new industries.

"Take government clear out of any regulation by subsidized competition with private enterprises. If these are abused in any industry the government has ample power to regulate them. It has neither the right nor duty to do this by competing.

"Prevent every unfair business practice or any that are harmful to the public interest, but do this by singling out the particular harmful practice and malefactor. Do not do it by condemning business as a whole and holding it up to contempt. The only purpose in the present policy is a demagogic political intent of inciting class hatred to create a party of discontents."

"You salesmen have done more to simplify and stabilize the distribution of paper and paper products than any other agency," asserted Mr. Everest in addressing the Salesmen's Association luncheon.

"During the last ten years we have been going through a series of economic, political and legislative gymnastics never before known in this country. The rules of the game have been changed from day to day. Management has so many new fangled ideas thrust upon it that it has welcomed the opportunity to dump into your laps those things which have to do with the sale and distribution of its products.

"I have often thought of your situation

in all this complicated mess of the last few years. I have heard much wild talk about government taking over industry. In some quarters I have heard how labor would take over certain industries—a great hulabaloo about labor, capital and management. No one seemed to think about sales and distribution. You were the 'forgotten men.' These people who would seize industry have no more conception of your function in industry than 'the man in the moon.' They seem to think that all one has to do is to provide capital, labor and factory management to produce goods and the problem is solved. I contend that selling and distributing are even more important factors.

"Through your association work and particularly your close contact with users of paper I think you have improved the sales end of this industry tremendously. I feel that in this industry we have better than the customary 85 per cent of decent citizens, and if we have 10 to 15 per cent of 'chiselers,' it is due to the fact that they have refused to join your organization. 'Chiselers' as a rule never join in any association work. No one, with any degree of intelligence or decency, could long associate with this organization without becoming a better citizen and a better salesman.

"From now on, our hope lies in going ahead on a common sense basis, endeavoring to extend our business through new uses and maintaining presently established uses. With the members of your organization rests the success of this industry for 1938. I have faith in your ability to handle the situation in a sensible and effective manner."

Carl E. Whitney, counsel for the American Paper and Pulp Association, announced that the luncheon was the largest gathering of its kind ever held in the Waldorf. He praised the Salesmen's Association for its work in forming the Import Committee, which he said has done more for the industry than anything. He told the salesmen that they have the power to do more for the industry than have its chief executives.

Frank Harris, who has completed 47 years with the West Virginia Pulp and Paper Company, this year celebrating its golden anniversary, was introduced amid much applause.

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◆ Mill Supply Dealers Dinner

With more than 200 leading paper mill supplies dealers from the metropolitan New York district and other Eastern centers as well as a generous number of paper mill purchasing agents and other officials present, the thirtieth annual banquet of the New York Association of Dealers in Paper Mills Supplies, Inc., was held in the East Ballroom of the Hotel Commodore on the evening of February 23. This dinner is always a social feature during Paper Manufacturers Week in New York.

An excellent repast of seven courses was served, after which a two-hour show was put on, consisting of about eight acts by talented vocalists, dancers, tricksters and jugglers. The hit of the entertainment program was a quintet of Hill-Billy musicians, who took the audience by storm with their melodies and fun-making. The performance was on a stage at one side of the dining hall, affording an unobstructed view to all present.

Walter H. Martens, of George W. Millar & Co., Inc., New York, and former president of the Association, was chairman of the Banquet Committee, assisted by Joseph P. Gaccione, Harris Goldman, Julius Levine, Arthur Rosenfeld, Louis Gottlieb and Frank Valva.

A handsome journal containing the program and menu and advertisements from a large number of firms in the trade was distributed as a souvenir of the occasion.

◆ TWO MONTHS IN ADVANCE OF SCHEDULE, the first machine in the Ontario Paper Company's Baie Comeau mill went into production in January. The newsprint mill has a rated capacity of 350 tons but will probably reach a substantially larger output when it reaches its full efficiency.

◆ AN ADDITIONAL 60-CYCLE, 34,000 horsepower generator at the Chelsea hydroelectric plant and a second 110,000 volt circuit will be added to the Gatineau Power Company at an approximate cost of $750,000 if plans for such an expenditure are approved by the Provincial Electricity Board of the Province of Quebec.

◆ Paper Merchants Meeting

The thirty-fifth annual convention of the National Paper Trade Association of the United States, whose membership comprises the leading paper jobbers and merchants of the country, was one of the largest and most successful yearly gatherings in the history of this long established trade group. Morning and afternoon sessions were held for two days, on February 22 and 23, at the Waldorf-Astoria Hotel in New York City, simultaneously with the convention of the American Paper and Pulp Association and affiliated organizations.

George G. Cobean, of the J. W. Butler Paper Company, Chicago, was elected president for the ensuing year; Perry W. Lesh, of the C. P. Lesh Paper Company, Indianapolis, Ind., vice president in charge of the Fine Paper Division; F. T. Jamison, of the Interstate Cordage and Paper Company, Pittsburgh, Pa., vice president in charge of the Wrapping Paper Division; Charles W. Vernon, of Vernon Bros. & Co., New York, treasurer, and A. H. Chamberlain, of New York, was again chosen executive secretary. Mr. Cobean succeeds F. Bendel Tracy, of the Fort Hill Paper Company, Boston, as president of the Association.

Meetings of the paper merchants were addressed by George H. Mead, of The Mead Corporation; Albert M. Miller, of the Central Ohio Paper Company; J. K. Javits, who spoke on big and little business and trade associations, and other prominent speakers.

◆ Convention Notes

Exhibits of various companies manufacturing paper and paper products occupied an entire floor or more of the Waldorf-Astoria Hotel during the sixty-first annual American Paper and Pulp Association convention in New York. There was every conceivable kind of paper on display, and between the exhibits and entertaining by supply concerns and others, conventionites had their every spare minute taken up.

Prominent in the group attending the convention was George W. Sisson, Jr., president of the Racquette River Paper Company, Potsdam, N. Y., this making the thirty-sixth annual A.P.P.A. convention Mr. Sisson has attended. Mr. Sisson was president of the Association during the crucial years of the world war. Incidentally, Mr. Sisson celebrated two important anniversaries in 1937—his 75th birthday and his 50th wedding anniversary.

A benedict at the annual confab of paper manufacturers was Joseph M. Conway, president of the Hoberg Paper Mills, Inc., Green Bay, Wis., who was married the week preceding the convention and who was in New York with his bride. Once the convention was over, Mr. Conway left for Miami, Florida, for a well-deserved honeymoon.

Johaneson, Wales & Sparre, Inc., wood pulp importers and agents of New York, entertained their many mill friends at a Swedish Buffet each day during the convention in their suite at the Waldorf-Astoria.

Paper men who are graduates of the University of Maine gathered for their annual dinner at the Hotel Lexington, New York, on the evening of February 23 during the convention. The principal speaker at the dinner was the University's president, Arthur A. Hauck. George Bearce, general manager of the Maine-Seaboard Paper Company, was in charge of arrangements for the event.

◆ Personnel Changes at Crossett Paper Mills

A number of important changes in personnel were reported recently at the Crossett Paper Mills.

John Lyden, formerly with the Rust Engineering Company, is now general superintendent of the mill at Crossett, Arkansas. Mr. Lyden succeeds Bruce Suttle who resigned December 1.

New mill manager is R. G. Seip, formerly with Hardy S. Ferguson & Co., designing engineers of the Crossett mill. E. L. Hobaugh, who was connected with the Minnesota and Ontario Paper Company at International Falls, Minn., has accepted a position with Crossett as superintendent of the paper mill.

In addition it is reported that R. E. Ferguson has accepted a position with Crossett as master mechanic. A. C. Spaulding, long a member of the staff of the National Paper Trade Association, has resigned and is now sales manager of the Crossett Paper Mills with headquarters in Chicago.

Survey of the Paper Industry*

WITH demand for all lines of paper products running below comparable levels of the preceding year, net income for the industry will most certainly show a drastic decline during the first half of 1938. While individual concerns in more favored divisions may be able to make up most of the earlier losses during the second six months, these companies will definitely be the exceptions to the rule.

Newsprint

Aggregate North American newsprint production in 1937, as reported by the News Print Service Bureau, amounted to 4,944,000 tons, an 11.4% gain over 1936's output which was the old record. Ordinarily the establishment of a new volume peak is cause for gratification, but the industry can scarcely derive the usual satisfaction out of its accomplishment this time. For a good deal of the 1937 volume gain was artificially and unintentionally created and currently is working out to the industry's disadvantage.

Looking beyond the present period of poor business and the problems it creates for newsprint manufacturers, one can not help but wonder if a return to good times will mean the beginning of another orgy of over-expansion. While history has a habit of repeating itself, the fact that Canadian Provincial Governments are currently adverse to approving any uneconomic move on the part of the industry should be an effective break. The Government's power is real—it is the landlord owning most of the timberland available for pulpwood purposes.

This, however, does not mean that there will be no further expansion. In fact, there is a real long-term threat of competition from a new field—newsprint made from Southern slash pine. In our Southern states there are available some 140 million acres of forest land, where pines attain maturity in from ten to twenty years as against the forty to eighty-year span required by spruce and hemlock. Additionally, the temperate climate of our Southern states enables full year-round forest operations—and labor costs are lower. Finally, closer proximity to important consuming centers reduces freight charges.

Standing as a barrier to the development of these newsprint resources have been technical problems in connection with the highly resinous content of the Southern pine. Repeated experiments by Dr. Charles H. Herty, former President of the American Chemical Society, are claimed to have resulted in a product adaptable to newsprint purposes. Nevertheless, many paper specialists remain skeptical as to the practicability of the new process. However, at least one attempt to exploit Southern newsprint on a commercial basis is planned in Eastern Texas. A market for the output is assured by Southern publishers. If successful, the "experiment" holds definitely bearish long-term implications for the Northern newsprint industry.

Wrapping Paper and Paper Bags

From a volume standpoint, wrapping paper is the second most important division of the domestic paper industry. Estimated at 1,784,000 tons, production of this material accounted for 15 per cent of aggregate paper goods turned out in 1936. Since 1929, output of this division has expanded 11.1 per cent, a rate second only to that enjoyed by the paperboard division.

After establishing an all-time volume record in 1936, orders for wrapping paper jumped 29 per cent, to 1,087,000 tons, during the first six months of 1937. Since June, however, the trend of new orders has been definitely down, the gain for the first eleven months having been reduced to a mere 1.2 per cent.

Since the late 1920s, when it first accounted for more than half of all bag and wrapping paper, kraft paper has shown steady gains in volume. The reason for this showing rests with the fact that kraft paper is made at a considerably lower cost than grades formerly popular.

The raw material used is the abundant, rapidly growing slash pine of our Southern States, which both produces a stronger product and has the advantage of considerably lower cost. Practically all items entering into the finished product —pulp, power, labor, and transportation —cost less. Taking pulp as an example: the raw material (Southern yellow pine) averaged $4.77 a cord in 1935, vs. $10.20 for domestic balsam fir and $7.92 for jack pine. Estimates as to the over-all cost differential favor Southern kraft over Northern sulphite by from $20 to $30 a ton.

It is only natural that so inviting a field should have been exploited widely. But the result already has been over-expansion to the point of threatening price structures seriously. In fact, by the close of this year, if all projects started and contemplated are carried through to completion, domestic capacity will have been increased by 1,200,000 tons of pulp annually. Such a figure, alone, represents 47 per cent of the total 1936 consumption of this product. While most of the new mills are to produce pulp for container board, excess capacity in this division is bound to affect price structures in a field so closely related as wrapping paper.

While the threat of over-capacity is a real one, the situation has certain alleviating factors, some of which, however, are more potential than actual. The first of these (primarily potential) is development of an export market for kraft pulp. The role of pulp exporter taken by the U. S.—the world's largest importer—may sound strange. But the facts are that the new cheap pulp will not only cut out a large percentage of our imports but also place us in a position to compete in world markets where demand is already overtaking supply due to restrictions existing in many exporting nations.

The second factor is that some of the new mills are concentrating on bleached sulphate for noncompetitive products such as book paper, paper towels, and tissues. Other plants could be converted into this field. Thirdly, a certain number of projects planned will undoubtedly be dropped as a result of the poor general business conditions prevailing. And, of course, there is the distinct probability that demand for both paperboard and wrapping paper will move upward when business conditions again turn favorable. However, even though all these favorable factors become operative, the industry appears in for a period of readjustment.

Magazine, Book, and Writing Paper

Usually less spectacular than other divisions of the industry, producers of magazine, cover, and book paper have enjoyed a veritable windfall of business as a result of the large number of new weekly and monthly publications that have been launched in the past year or so. How much of this new business will prove to be of the "flash in the pan" nature is, of course, unpredictable; but that an important amount of lasting volume has been gained, is a reasonable expectation. In addition to the new magazines, this division has been getting larger orders from older customers whose circulations have scored wide gains.

Raw material costs have gone up faster in this division of the industry than in the others. The reason for this lies with the fact that a scarcity of bleached sulphite pulp (major raw material) has developed, and has sent the price up roughly 100 per cent in the past year or so. However, new capacity recently made available should alleviate this situation.

The use of fine writing papers is confined to a relatively narrow market. Necessarily, companies devoted largely to production of such specialties, are of small stature and enjoy limited growth possibilities. Manufacturers in this division fall into a luxury class, catering to the demand for relatively higher grade products. Accordingly, they have been slow to recover from depression influences. What money is made in this division usually comes towards the end of a business cycle, after which heavy losses occur.

With the exception of the office equipment industry it would be difficult to find a group of companies that have benefited as much from New Deal legislation as producers of letter-head, journal, ledger, and special office form bonds. This list of laws, compliance with and administration of which have bolstered sales of this type of paper, is long. Among the more important ones are, The Social Security Act (a law which, incidentally,

*Taken from *Poor's Industry and Investment Surveys*, January 28, 1938.

is not particularly burdensome to the paper industry as a whole, due to a rather low ratio of labor costs to product value), the closely allied Unemployment Insurance laws of the States, and the Robinson-Patman Act. Moreover, these new uses, which are here to stay, act as a cushion to falling general line demand when business conditions are relatively unfavorable, as at present.

General

The usage of paper products serves a wide variety of human needs, both commercial and cultural. Production of paperboard represents by volume the domestic industry's most important division . . . Newsprint (when Canadian output is included), however, runs a close second. Wrapping paper, book and fine papers comprise respectively the other important divisions.

In the commercial field, the potential uses to which paper can be put, appear unlimited. Wooden boxes have given way to paperboard containers; glass jars are meeting competition from paraffined paper jars; paperboard walls are being substituted for lath and plaster, while more recently a paper container, aimed at sharing with tin cans the profitable packaging of oil, has been devised. Always the main sales argument is, "lower cost," the sure volume builder.

In addition, paper's base commodity, wood pulp, also serves as a raw material for other products. Leading example is bleached sulphite pulp, used in manufacturing rayon. Between 1929 and 1937 production of rayon jumped 157 per cent. Demand from this source, coupled with shrinking foreign supplies (due to expanding demand at home arising in part from diversion into the field of armaments) has shot bleached sulphite pulp quotations up 100 per cent in the past year or so.

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◆ G. H. Bucher Now Heads Westinghouse Electric

George H. Bucher, executive vice-president of the Westinghouse Electric & Manufacturing Company, has been elected president of the company to succeed Frank H. Merrick, it was announced recently by A. W. Robertson, chairman of the board. Mr. Merrick has been elected vice-chairman.

Mr. Bucher, who began work with Westinghouse in 1909, was formerly a coil winder at the East Pittsburgh plant. Later he became clerk in the export department of the company which has since become the Westinghouse Electric International Company. In 1920 he was appointed assistant to the general manager of the International division and a year later he became assistant general manager. This position he held until 1932 when he became vice-president and general manager. Mr. Bucher was elected president and general manager of the International company in 1934. The following year he became a vice-president of the parent company and in 1937 he was named executive vice-president and a director of the company.

Mr. Merrick, elected vice-chairman, has been a member of Westinghouse since 1902 when the latter firm absorbed the Steel Motor Company of which Mr. Merrick was manager and chief engineer. In 1925 he became vice-president and general manager of the company and four years later was elected president.

◆ Dalrymple Has New Post at Crocker-McElwain

Well known in the western Massachusetts paper field by former associations with companies there, William Dalrymple, superintendent of the Lee Paper Company, Vicksburg, Mich., has resigned to become superintendent of the Crocker-McElwain Paper Company of Holyoke, Mass.

Mr. Dalrymple was associated with the Valley Paper Company of Holyoke from 1924 to 1926 and was superintendent of the Parsons Division of the American Writing Paper Corporation until 1932, when he left to become superintendent at the Lee company. Prior to his connections in Holyoke, Mr. Dalrymple worked for the Rainbow Paper Company, Windsor, Conn., for six years and was also associated with the Strathmore Paper Company of Westfield, Mass., for several years.

◆ Announce Winners in I.P.I. Essay Contest

The essay contest for high school students of printing, sponsored by the International Printing Ink Corp., in cooperation with the National Graphic Arts Education Guild, has just been completed and the winners have been announced.

The $400 university scholarship in the contest on color was won by William Brown, 16, a junior in the Abraham Lincoln High School, Los Angeles, while the first prize in the freshman-sophomore group was won by Joseph Kuchinsky, Junior High School No. 73, Maspeth, Long Island. A girl, Mary Potter, won the second prize in this group; a $50 practice printing press. The trips to New York, first prize in the freshman-sophomore group and second prize in the junior-senior group, were won, ironically enough, by boys who could make the trip via the New York subway. Suitable substitute awards will be made these students.

The national winners will receive gold Franklin Medallions and the two second prize winners will be awarded silver ones. About 6,000 students from 270 schools in the United States and Canada submitted essays this year.

◆ Harry Turner

Well known throughout the industry for his safety work, Harry Turner, director of safety at the Consolidated Paper Corp., passed away January 21 in Grand 'Mere, Quebec.

Mr. Turner was born in 1875 in England and came to Canada in 1908, being first employed in the accounting department of the Grand Trunk Railway. In 1913 he entered the accounting department of Laurentide Company, Ltd., Grand 'Mere, and in 1917 was placed in charge of their "safety first" work. In 1928, when the Laurentide company became part of the Canada Power and Paper Corporation, Mr. Turner was appointed director of safety and he continued to hold this position when the re-organization into the Consolidated Paper Corporation, Ltd., took place in 1932.

Mr. Turner took a keen interest in the activities of the Pulp and Paper Divisions of the National Safety Council and served on important committees, contributing papers and many helpful suggestions regarding first aid and safety work in the pulp and paper industry. He was very successful in greatly reducing both frequency and severity rates of accidents in the various mills which came under his supervision. Surviving Mr. Turner are his wife and two children.

◆ Port Angeles Mills Make Several Personnel Changes

Several important changes in personnel were made recently at the two largest pulp and paper mills in Port Angeles, Wash.

Norman B. Gibbs, resident manager of both the Washington Pulp and Paper Corporation and the Port Angeles branch of Rayonier, Inc., has withdrawn from that position to devote full time to supervisory work for the Rayonier organization.

New resident manager of the Port Angeles Rayonier unit is A. W. Berggren, former manager of the Shaffer Pulp Company at Tacoma, Wash.

Raymond Dupuis, formerly resident engineer of the Washington Pulp and Paper Corporation, has assumed the resident managership. His successor is Thomas B. Hargreaves, formerly in charge of the mill's electrical and steam power divisions.

◆ Present Plaque to Calder on Silver Anniversary

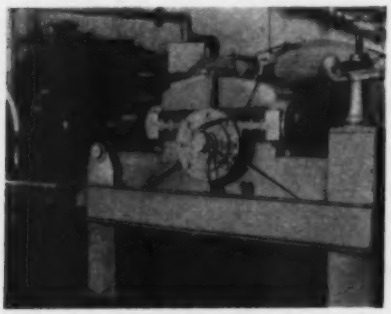
A silver testimonial plaque, bearing the engraved signatures of 116 associates, was recently tendered Alexander Calder, president of the Union Bag and Paper Corporation, in honor of his twenty-fifth anniversary with the company.

The signatures engraved on the testimonial plaque were divided into groups according to length of service with the company. Ten names were included in the group of those who joined the organization between 1888 and 1900. Thirty-three signatures represented people who started with the company between 1910 and 1920. Mr. Calder joined the organization on February 1, 1913, as a salesman. In 1924 he was made vice-president in charge of sales and in 1931 he became president of the company.

The testimonial plaque, which pays tribute to his leadership, foresight and understanding is inscribed to "Sandy" as Mr. Calder is best known by his associates and by his friends in the paper industry. Employees in the Hudson Falls, Savannah and Los Angeles plants joined in presenting this testimonial on Mr. Calder's silver anniversary.

◆ Self-Contained Drive for Beaters

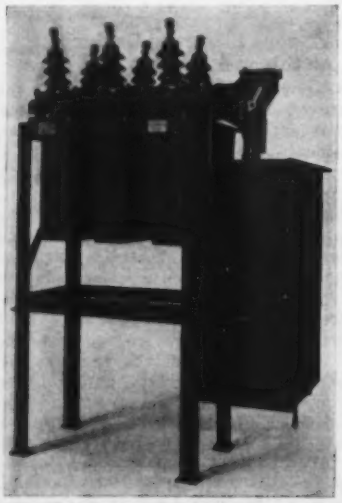
A patented self-contained drive for beaters, designated as the Bessmer beater drive, has been announced by The Noble & Wood Machine Company, Hoosick Falls, N. Y. The drive is through a motor, direct connected by coupling and gears to the beater spindle. It is totally enclosed,



the gear case and motor support being combined with the lighter bar. The lighter bar is hung on a barrel-shaped fulcrum pin, providing floating power and permitting the roll to "jump" if necessary. Anti-friction bearings, self-lubricated by a gear-type oil pump and circulating system built into the unit, are used throughout. The coupling is designed to take up the load gradually and to automatically release itself should the roll plug or should a load in excess of that for which the coupling is set be built up from any other cause. All parts are standard, including the motor, coupling, gears and bearings.

◆ Outdoor Oil Circuit Breaker

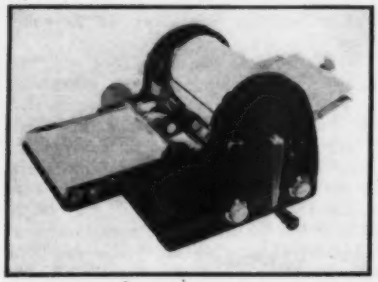
Allis-Chalmers Manufacturing Company, Condit Works, Boston, Massachusetts, has announced a new moderate capacity outdoor oil circuit breaker of the



quick clearing, non-oil-throwing design, known as the type OZ-110. Special interrupting devices called Ruptors are used to give quick clearing of short circuits, low arc energy, low pressure, and minimum of oil deterioration. Other features are: rigid cast steel top frames; silver contact surfaces; low-inertia, straight-line-motion type mechanisms; roomy, weather-proof control cabinet; one-piece, wet process porcelain bushings. The breaker is furnished for 600 amperes at 15 kv., with an interrupting capacity rating of 100,000 kva. It is arranged for pole or frame mounting.

◆ Office Duplicator

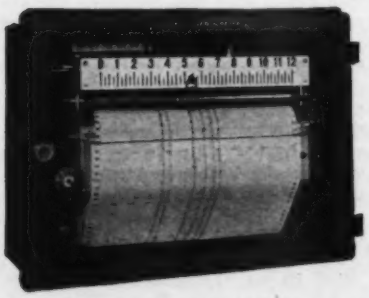
A self-feeding and self-ejecting office duplicator which makes up to 300 bright copies direct from one handwritten, typed or drawn original, without the aid of stencils or gelatine, has been announced by Ditto, Incorporated, Chicago, Illinois. The manufacturer claims the machine



will produce 70 copies per minute, on paper as large as 9" x 14" and varying in weight from tissue to card stock. A newly designed stationary type feed unit assures fast feeding and accurate registration. Reproductions in one or all of five colors are made in one operation. When a run is completed, the original may be filed and used repeatedly over a period of months until 300 copies have been produced.

◆ Multiple Recording Potentiometer Pyrometer

The Brown Instrument Company, Philadelphia, Pa., has announced a multi-color numeral printing potentiometer pyrometer. This pyrometer is designed to continuously record from two to six temperatures from as many different thermocouples. The record is made in multi-color on a chart 12 in. in width. Multi-color numerals on the chart iden-



tify the thermocouples from which the temperature records are being made; while a (+) sign identifies the temperature and time co-ordinates, the vertical line of the (+) sign being the temperature; the horizontal, the time; and the intersection of the two lines, the exact point of the time-temperature record.

◆ Full Vision Gas Mask

Acme Protection Equipment Company, 2678 Koppers Bldg., Pittsburgh, Pa., has introduced a canister mask in which the lenses, made of scatterproof laminated

plate glass, afford 90 deg. vertical and 170 deg. lateral vision. The mask, available in both corrugated tube and snout types, utilizes a light-weight, fully-molded all-rubber face piece. Head harness connections are located to eliminate forehead pressure points. The head harness may be of elastic, all rubber or of non-rubber material. There also is a wide selection of canisters covering acid gases, organic vapors, and combinations of them.

◆ Lighting Equipment Improvement

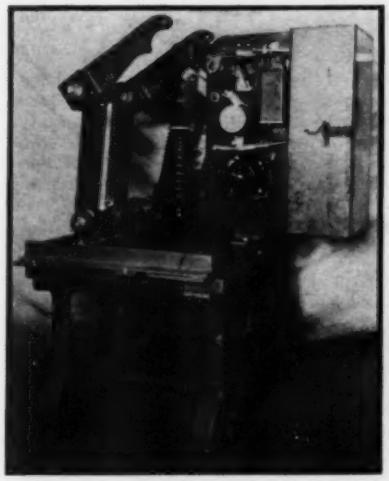
Benjamin Electric Mfg. Co., Des Plaines, Ill., has announced an improvement in its patented Benjamin "Turnlox" hood construction. Only a single 90 deg. twist is required to remove reflector, globe and lamp from its socket. Electrical

and mechanical connections are made with the socket through a three-point, self-centering, bayonet lock. The socket hood, available in both ceiling mount and pendant types, is supplied with a porcelain terminal base which fits any medium size or mogul base "Turnlox" reflector assembly. A lightweight shaft and en-

gaging device, known as a reflector changer, permits the operator, standing on the floor, to remove and replace the fixture at heights up to 18 ft.

◆ Cam-Operated Circuit Breaker Mechanism

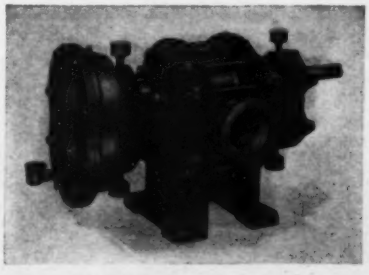
A new circuit breaker mechanism has been developed by the switchgear division of the General Electric Company, Schenectady, N. Y., to supersede the centrifugal motor mechanism formerly used to operate Type FH oil-blast circuit



breakers. Supplied for d. c. operation, the new mechanism, designated as Type ME-10, is a positive, high-speed, motor-driven cam device which takes four inches less headroom than the old type. The cam acts against a roller connected to a standard trip-free linkage. At the end of the closing stroke, the motor is electrically disconnected, the excess of the cam absorbed by a dashpot, and the cam returned to starting position by a spring.

◆ Rotary Pumps for Viscous Chemicals

Worthington Pump and Machinery Corporation, Harrison, N. J., has announced a complete line of specially designed rotary pumps for the handling of viscous



chemicals. These pumps are ruggedly constructed; are available in iron, bronze, Monel, nickel, Everdur, stainless steel, aluminum, etc.; and are built for capacities up to 700 g. p. m., pressures up to 150 lb. per square inch, and viscosities up to 500,000 SSU or 110,000 centipoises.

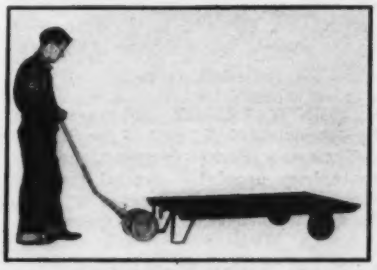
◆ Pressure Lubricator Line

Four gun-type pressure lubricators, designed for supplying oil to bearings, gears and other moving parts of machinery at pressures up to 1000 pounds, has been announced by the American Chain & Cable Company, Inc., York, Pa., as an addition to its line of pressure lubrica-

tors. The line, known as the ACCO-MORROW PRESSURE LUBRICATOR line, also includes six models for an operating pressure up to 500 lb.

◆ Hand-Operated Skid-Type Truck

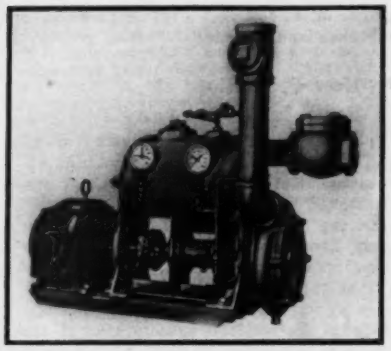
Barrett-Cravens Company, 3262 West Thirtieth Street, Chicago, Illinois, has announced a new design of hand-operated truck under the designation of Barrett Lift Jack. This truck consists of a combination of a lift jack and a skid. The lift jack is equipped with a spring handle holdup, and two 9 in. wheels, each Hyatt bearing equipped; and weighs 64 lb. It has a handle length of 48 in., a width of 11½ in., a wheel tread of 8 in., and an angle lift of 150 deg. The skid, made



in fifteen sizes, is commonly of steel bound construction with hard maple topboards but a steel top skid may be furnished, if desired. Two 9 in. diameter, Hyatt bearing equipped wheels, either chilled iron or rubber tired, support the rear end of the skid; while the front end is supported by two machine-formed legs which are welded to the frame. Centered between the two front legs is a lifting horn with which the lift jack, through a downward motion of the handle, makes engagement and elevates the two skid legs clear of the floor. The skid is lowered to the floor by lowering the towing handle. This movement of the handle permits a loaded skid to settle down gently under full control of the operator.

◆ Self-Priming Pump

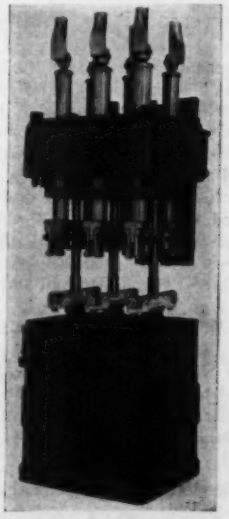
A self-priming pump arrangement, designated as the Hazelton-Auto-Pump, has been announced by the Barrett-Haentjens & Co., Hazelton, Pa. The arrangement



combines a centrifugal pump and a priming tank into a compact unit which is adaptable to full automatic control. The unit is available in six sizes ranging from 1 to 15 hp.

◆ Oil Circuit Breaker

Allis-Chalmers Manufacturing Company, Condit Works, Boston, Massachusetts has announced a moderate capacity indoor oil circuit breaker of non-oil-throwing construction. The breaker, known as Type DX-25, is furnished manually or electrically operated for 600, 1200, and 2000 amperes at 15,000, 7500 and 5000 volts respectively. It has an interrupting capacity of 75,000 kva. Expulsion ports, featured in the breaker, are devices which, it is claimed, hasten



are extinction. Other features include: self-aligning, wedge and finger type contacts with silver surfaces on main contacts; cast steel top frame; electrically welded steel tank; one-piece bushings; and flat angle, straight-line-motion type mechanism.

◆ Hagar Straw Board Paper Co. Bought by Mead Corporation

For the past forty-five years owned and operated by the Hagar family, the Hagar Straw Board Paper Company, Cedarville, Ohio, has been purchased by the Mead Corporation at a sale price reported as $150,000. The transaction included plant buildings, a warehouse, equipment and an 85 acre tract of land. The Mead organization will take over the property April 1. The latter company's future plans have not been announced.

◆ New Promotions at Scott Paper Company

Three senior officers have been advanced and three new junior officers have been appointed at the Scott Paper Company, Chester, Pa.

In the former group, Raymond C. Mateer, formerly assistant treasurer, has been made vice-president in charge of purchasing and William C. Carney has been appointed controller. W. S. Campbell has been elected secretary of the company to succeed Ralph E. Rhoads, who recently resigned as an officer because of ill health.

Included in the junior officer appointment are: W. R. Scott, 3rd assistant secretary; J. C. R. Whiteley, assistant treasurer; and Francis W. Plowman, assistant controller. Thomas B. McCabe is president of the Scott Paper Company and Edward S. Wagner is first vice-president.

◆ THE NATIONAL GYPSUM COMPANY will built a $1,000,000 plant in Mobile, Ala., according to a recent press report. The plant will manufacture fiber board and other building materials. Construction work was to have begun in January.

◆ Sinding-Larsen Now Chief Engineer at Pitts. Piping

Associated with the Pittsburgh Piping and Equipment Co. since 1924, G. Sinding-Larsen has been appointed chief engineer.

Mr. Sinding-Larsen, a native of Norway, received his education at the Technical College of Oslo, from which he graduated in 1912 with a M. E. degree. He came to America in 1921 and gained widespread experience in all phases of power and process piping with the J. G. White Co., Consolidated Edison Co., of New York and Sanderson and Porter Co., consulting engineers.

Since his affiliation with the Pittsburgh concern, Mr. Sinding-Larsen has been active in the research and development of creased bends and corrugated pipe and their application to steam lines and central station design.

◆ Fiske Warren

Widely-known as a philanthropist, sportsman and papermaker, Fiske Warren passed away February 2 at the age of 75 at the Phillips House (Mass.) General Hospital.

Mr. Warren, who was the son of the S. D. Warren Company's founder, graduated from Harvard in 1884 and immediately gained first-hand paper making experience in his father's company. Although Mr. Warren was interested in the business for many years and held official positions, his outside interests occupied a greater part of his life. As an athlete he specialized in tennis and won the national singles championship in 1883. He also designed and operated the first electric carriage in Massachusetts in 1891.

An active participant in a great many clubs and committees, Mr. Warren had held membership for years in the Boston Paper Trade Association and the Society of Chemical Industry.

◆ UNBLEACHED KRAFT PULP, totalling 15,000 tons per year, will be purchased by the Robert Gair Company from the North Carolina Pulp Co., a subsidiary of Kieckhefer Container Co.

◆ New Photographic Lens Shown by Bausch & Lomb

A new photographic lens which enables a single photograph taken straight down from an airplane to show three times as much area as has been previously possible from the same altitude, was shown in Rochester, N. Y., recently by engineers of the Bausch & Lomb Optical Co.

With this new lens, which is called the Metrogon, a plane can photograph three times as much ground without flying any higher or farther than has been necessary with the average lens previously used. The Metrogon covers 90 degrees of field and has a focal length of five and a quarter inches. So clear is the definition it gives that a photograph made from a height of one mile can show separate railroad ties anywhere within a two-mile circle beneath the plane, tests in the company's scientific bureau has disclosed.

◆ THE BRUNSWICK PULP AND PAPER COMPANY offices are now located in the company's building on the Turtle River site. Until recently the business of the company was carried on in the Brunswick Bank and Trust Building. The office building was completed a short time ago and is equipped with all the latest improvements and conveniences.

◆ JOHN W. BRIGHT, mill manager of the Greenwich, N. Y., mill of the Stevens & Thompson Paper Company, has recently been appointed general manager of the company's mills located in North Hoosac, Walloomasac and Greenwich.

◆ Show Motion Pictures at Pacific Coast TAPPI

About 125 members of the Pacific Coast TAPPI attended the monthly dinner in Camas, Wash., February 8. Roderic Olzendam, public relations expert for the Weyerhauser Timber Company, was the principal speaker. N. W. Coaster of the Soundview Pulp Company, Everett, Wash., presided at the meeting and motion pictures of the American Potash and Chemical Corporation's operations at Trona, Calif., were shown.

◆ A. S. Chaves Resigns Foreign Post at Brown Company

Manager of the Brown Company's foreign department, Alvaro S. Chaves resigned recently and returned to his home in Rio de Janeiro. Mr. Chaves has traveled extensively for Brown Company and was a substantial contributor to the development of the company's large export business in rayon, Solka and other special pulps. Downing P. Brown, formerly sales manager of the company, succeeds Mr. Chaves as foreign department manager.

◆ A FORTY YEAR GROUP, composed exclusively of those who have been with the B. F. Goodrich Company four decades or longer, has been organized recently at the latter company by fifteen men who have been with the concern 40 years or more. Each of these veteran employees has been presented a diamond-studded 40-year service pin.

◆ New Dixie-Vortex Designs

New 1938 designs, the Daffodil and the Willow, have been released lately by the Dixie-Vortex Company of Chicago and Easton, Pa. The former design consists of a bouquet of daffodils in natural yellow and green colors while the latter inspiration is taken from the long-famous design originally used on porcelain and stoneware and which is Chinese in motif. The Dixie-Vortex Company is also retaining the Port Hole design, which was new last year Menasha paper plates, napkins and tablecloths are available in matching designs with the new Dixie cups.

◆ Michael J. Redmond

Michael J. Redmond, general superintendent and a member of the board of the Kalamazoo Paper Company, passed away February 10, while visiting his brother in Los Angeles, California.

Mr. Redmond, one of the best known papermakers in the Kalamazoo River Valley, started work with the Kalamazoo firm in 1881 as screen boy. In 1914 he became general superintendent and in 1933 he was elected to the board of directors.

Surviving Mr. Redmond are three daughters, one son, five brothers and two sisters.

◆ RHINELANDER PAPER COMPANY, Rhinelander, Wis., will modernize one of its paper making machines at an estimated cost of $35,000, it was revealed recently.

◆ L. C. Anderson

Widely known throughout the Miami Valley and in paper circles, L. C. Anderson, vice-president and a director of the Sorg Paper Company, passed away February 3 in Cincinnati after an illness of several weeks.

Mr. Anderson was formerly connected with the Nashua Gummed and Coated Paper Company and was also a director of the First American Bank and Trust Company as well as of the Raymond Bag Company, Middletown, Ohio. He is survived by his widow, a daughter, a sister and a brother.

◆ St. Joe Paper to Buy Gair Thames River Mill

According to a recent announcement by E. Victor Donaldson, president of Robert Gair Company, Inc., the St. Joe Paper Co., Port St. Joe, Fla., has agreed to purchase the Thames River paperboard mill of the Robert Gair Co., located at New London, Conn. It was also announced that the Robert Gair Co. had agreed to purchase from the St. Joe Paper Co., over a period of years, a substantial tonnage of kraft container board to be manufactured at the new mill of the St. Joe company in Florida. This will not affect the manufacture of shipping containers by Gair.

◆ J. H. Leo New Manager of Brown Towel Division

New manager of the Towel Division of the Brown Company is John H. "Jack" Leo, formerly assistant manager of the division. Mr. Leo, a well known figure in the trade, will be located at the company's offices in the Graybar Building, 420 Lexington Avenue, New York City, which will become the general offices for the Towel Division. Mr. Leo sold the first Nibroc towels ever produced by the Brown Company and has contacted towel distributors all over the country for the past 16 years.

◆ Lake Sulphite Pulp Co. Now in Receivership

The Lake Sulphite Pulp Company was petitioned in receivership recently and George S. Currie, of McDonald, Currie and Company, was appointed receiver and manager. Mr. Currie issued a statement to the effect that steps would be taken to conserve assets and that arrangements were being made for temporary borrowing for that purpose. The company is, at present, constructing a sulphite mill at Red Rock, Ontario.

It is understood that the company's financial difficulties have arisen largely from the fact that actual costs involved in bringing the company into production have been substantially in excess of estimates. It had been estimated that the mill could be brought into production for about $5,000,000 but it is said that the actual figure may be nearly $1,000,000 above that amount.

◆ Move to Decentralize Int'l Paper and Power Company

Further moves towards the decentralization of the International Paper and Power Company occurred recently. Following the election of John H. Hinman as president of the Canadian International Paper Company, it was revealed that the George & Sherrad Company has become a subsidiary of the American company while St. George Timberlands, Ltd., and Nipigon Corporations, Ltd., have been transferred to other interests.

In addition it was learned that the Continental Paper and Bag Corporation, the Glen Junction Transfer Company and the Hedkimer Fibre Company have been dissolved and the assets of the Victory Bag and Paper Company transferred to the Southern Kraft Corporation. Newsprint sales will be handled under a contractual agreement with the Newfoundland and Canadian companies by International Paper Sales Company of New York. Bank loans of $11,000,000 to finance the Springhill, La., and the Georgetown, S. C., mills, recently erected by Southern Kraft, have been reported by the International company.

◆ New Consolidated Machine Begins Production

The Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., inaugurated a revolutionary change in the manufacture of paper recently by the start of full time production and coating of fine book paper in one operation. The machine, built to order to perform this operation by Rice, Barton & Fales, of Worcester, Mass., is a major part of the $1,500,000 expansion program undertaken by Consolidated.

Five machines at Wisconsin Rapids are now equipped to turn out coated book paper and one at Biron has also been equipped for its production. The expansion program came about largely as the result of a huge contract obtained from *Life* magazine.

◆ Expect New KVP Paper Machine to Operate Soon

In addition to the announcement of a successful year's operation at the annual meeting of the Kalamazoo Vegetable Parchment Company it was also reported that the new paper machine would be in operation by April 1. With its current building program finished, the company is now turning to the manufacture of new papers as additions to papers now in use in the food protection field.

◆ Everest and Conway on State Advisory Council

Two prominent Wisconsin paper makers: D. C. Everest, vice-president and general manager of the Marathon Paper Mills and Joseph M. Conway, president of Hoberg Paper Mills; have been selected by Governor LaFollette to serve on the advisory council heading the new state department of commerce. This department was created by the special session of the 1937 legislature to assist industry and commerce.

◆ S. L. de Carteret Now Manager of Canadian Int'l

S. L. de Carteret, formerly manager of the Brompton Pulp and Paper Company, is now general manager of the Canadian International Paper Company. Mr. de Carteret has been connected with the Riordan Pulp and Paper Company, Brown Corporation, Hammermill Paper Company, in addition to the Brompton organization. P. H. Scowen, who has been with the Brompton company for sixteen years in charge of kraft sales, succeeds Mr. de Carteret at the latter concern.

◆ New Catalogues and Publications

Benjamin Electric Mfg. Co., Des Plaines, Ill.—An interesting and pertinent subject, that of factory lighting practice, is treated in a clear and concise manner in a new manual recently issued by this company. The publication, 36 pages in length, is devoted to the problems of lighting and covers thirty such problems, stating the recommendations for each problem and the subsequent correct equipment specifications to solve the problem. The publication is well illustrated and is bound in a stiff cover.

Brown Instrument Co., Philadelphia, Pa.—This company has just put out an attractive new catalogue (No. 6502) dealing with its line of hygrometers. The bulletin illustrates the operating principles of recording hygrometers and psychrometers and points out the uses of the instruments in various industries. Each instrument is illustrated by means of colored photographs and each is carefully described by means of written material and specification data.

California Redwood Association, San Francisco, Calif.—Of special interest to pulp and paper manufacturers already using redwood tanks as well as those contemplating new installations is the new technical bulletin, *Redwood Tanks for the Pulp and Paper Mill*, prepared by B. F. Wade, consulting engineer for the Association. In the bulletin Mr. Wade describes the mechanical and physical properties of redwood with attention to their particular application for each specific use, including a study of general acid and alkali reactions and temperature effects.

DeLaval Steam Turbine Co., Trenton, N. J.—This company has recently issued an interesting article dealing with tests made with the company's geared turbines installed on the Standard Oil Company's tanker, Esso Bayonne. The article, written by Captain Felix Riesenberg, describes the test run of the new boat paying particular attention to the company's propelling units in operation.

Engineer Co., New York, N. Y.—Several new catalogues have been issued recently by this concern. Bulletin B-37 describes the construction and application of the company's baffle walls to modern boilers; Bulletin O-B 37 is devoted to a detailed account of the company's oil burning equipment and is concerned with oil and gas burners, mechanical and steam atomizers and fuel oil pumping and heating systems; and Bulletin 129 shows the principle of the Enco balanced draft and its application. In addition the company has prepared a valuable instruction book for the care and operation of Enco oil-burning equipment. The latter publication, is 44 pages in length. It, as well as the other bulletins, is illustrated throughout. These publications will be mailed to those interested, upon request.

Fairbanks, Morse & Co., Chicago, Ill.—Construction details of the F-M direct current motors in their various sizes are described in a new bulletin (No. 2260) recently issued by this company. Cross-sectional drawings, photographs and concise written material give the reader a clear understanding of the products thus described.

General Electric Co., Schenectady, N. Y.—This company has issued a bulletin (GEA-2450A) devoted to describing the construction and usages of its Type AE-1 air circuit breakers. The bulletin, punched for loose-leaf filing, is illustrated and presents the product by means of constructional views, drawings and thoroughly understandable written matter.

Goulds Pumps Inc., Seneca Falls, N. Y.—The complete new line of single stage, side suction, ball bearing centrifugal pumps made by this company are described in detail in a new bulletin (No. 210) now available from this concern.

D. W. Haering & Co., Inc., Chicago, Ill.—This company has recently announced publication of its house organ, "H-O-H Lighthouse," in a new and improved format and with a new series of feature articles dealing with water requirements and problems of specific industries. The publication is devoted to the dissemination of new scientific and personal views in the scale and corrosion fields and is distributed free of charge to anyone requesting to be placed on the mailing list.

Haynes Stellite Co., Kokomo, Ind.—An extremely interesting new brochure dealing with Hastelloy, high strength alloys for corrosion resistance, has been issued lately by this company. The publication describes the alloys in a detailed and carefully-written manner and uses photographs to good advantage throughout. All the physical and mechanical properties of the alloys are listed and information concerning the available forms and fabrication of the product is included. Other sections of the brochure are devoted to applications of the product and the resistance of the alloys to corrosive media.

Hyatt Bearings Division, General Motors Corp., Detroit, Mich.—An attractive booklet dealing with the various features of Hyatt bearings has been released lately by the company. Entitled *Your Ten Demandments*, the release presents by means of colored illustrations and concisely-written material, the elements to be considered in the manufacture of the company's bearings.

Packless Metal Products Corp., Long Island City, N. Y.—A new bulletin describing this company's seamless flexible metal hose and couplings has been released recently by this firm. Filled with complete data on the construction, uses and application of the products this book contains much of interest to the manufacturer. Arranged for filing purposes, even including a guide tab, this release would be a valuable reference in any industrial library.

Roots-Connersville Blower Corp., Connersville, Ind.—This company has recently issued a new bulletin (21-B-19) which discusses more completely, the company's Victor-Acme rotary positive blowers. The release is punched for loose-leaf filing and contains photographs and charts demonstrating the construction and application of the product. Included in this bulletin are tables showing dimensions of the blowers and their net capacities at listed pressures and speeds.

Signode Steel Strapping Co., Chicago, Ill.—A handy little booklet explaining the company's system of tensional steel strapping has been issued lately. The publication illustrates how various types of merchandise and products are shipped by means of steel strapping and explains the uses of the various types of band and equipment manufactured by the company.

SKF Industries, Inc., Philadelphia, Pa.—This company has just put out a new brochure announcing the addition of two new wings to the plant and the installation of new machinery. The release, appropriately entitled *New Wings*, shows both interior and exterior views of the plant together with a layout illustrating the location of the new additions.

Stephens-Adamson Mfg. Co., Aurora, Ill.—This company's variable reducer transmission is described in a new bulletin recently issued by this concern. Photographs showing actual applications of the product and cross-sectional drawings showing construction and features are included in the publication. Blueprint drawings, tables and reading matter present a complete picture of the company's product.

Troy Engine & Machine Co., Troy, Pa.—An interesting compilation is found in a recent bulletin (No. 101) issued by this company. Contained in the publication is a data sheet showing the determination of power costs in various plants throughout the country. The compilation covers 43 plants in various industries and covers every possible item bearing on costs. In addition to the very interesting results of this compilation, the bulletin contains a data blank which may be filled out and sent to the company for estimate of savings in power cost.

Turbo-Mixer Corp., New York, N. Y.—Several interesting new bulletins dealing with this company's mixers and allied equipment have been released recently. The general principles, applications and characteristics of the mixers are set forth in Bulletin No. 11. The Turbo drive for mixers and agitators is described in Bulletin No. 33 while the company's adapter for gear motor drives is presented in Bulletin No. 31. Various other releases carry the story of this company's continuous treaters, gas absorbers, blenders for asphalt cutbacks in addition to valuable material on asphalt blowing, heat transfer and applications of Turbo equipment in the food products industries and in the viscose process. These bulletins are written in a clear, concise manner and are punched for loose-leaf filing.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.—Arranged particularly for the non-technical man or for the plant maintenance man, this new 12-page publication dealing with the company's electric drive selector and hints on maintenance, describes and illustrates the requirements which must be met in selecting a motor.

Yarnall-Waring Co., Philadelphia, Pa.—This company has just put out a new bulletin (T-1733) describing the Yarway impulse steam trap. The 12-page publication illustrates the various features of the product by means of photographs and cross-sectional drawings in addition to well-written literature and dimensional tables. Typical installation views are shown and construction details are given.

BOOKS

Custom House Guide—The new, 1938 de luxe edition of this book contains, as one of its principal features, the new U. S. Customs Regulations of 1937 which entirely revises and supersedes the old 1931 regulations. Because of the inclusion of the new rates of duty established under the sixteen reciprocal trade agreements which have been concluded by the U. S. with foreign nations and of the many revisions enacted by Congress, the new volume is completely revised this year. The alphabetical list of 30,000 commodities has been entirely revised by customs and statistical experts. Opposite each commodity are the new rates of duty provided for in these sixteen reciprocal trade agreements. In the trade agreement section are included Schedules 11 (import) of each of the sixteen trade agreements enacted to date. Other information includes port sections which completely cover the activities and facilities of all principal ports and a section of general information which includes foreign forwarding agents, weights, measures, coin values, trade terms, air services, Federal Alcohol Administration, Department of Agriculture, State Department, Department of Commerce, Bureau of Foreign and Domestic Commerce, Consular Service, Foreign Customs Headquarters and Embassies, alcoholic beverage importers and exporters and other additional information. The books is published by Custom House Guide, Box 7, Sta. P., Custom House, N. Y. Price is $15.00.

Foreign Graphic Arts Industries, Trade Promotion Series, No. 72—An extremely interesting survey concerned with foreign markets for paper, has been released lately by the Department of Commerce. According to data contained in the report, the United States with the Dominion of Canada far outrank the rest of the world in paper production. Canada is the largest paper-exporting country in the world while the United States is the largest paper-consuming country in the world.

While the growth of a domestic paper manufacturing industry in several of the Latin American countries has curtailed to some extent the market for imported papers, these countries continue dependent upon foreign sources for newsprint, medium to fine book and writing papers, fancy coated papers and cardboards. Normally these countries are low priced markets and European manufacturers have proved formidable competitors to American exporters in this region, according to this report. United States exporters are more successful in securing a share of the trade in medium to high grade lines and in specialties. Argentina and Cuba offer the best markets for American papers in this area, the book says.

European countries do not offer a promising field to American manufacturers and exporters of papers consumed in the graphic arts industries, the book states.

The detailed coverage of the graphic arts industry in each foreign country as far as available information permits, shows the extent to which such products are used in the commercial, educational, and cultural activities of each foreign area, and provides manufacturers within these industries with a reliable groundwork for the determination of their potential markets. Each foreign country section of the report is so arranged that any part of the graphic arts industry may be easily reviewed.

Copies of this report, Foreign Graphic Arts Industries, Trade Promotion Series No. 172, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., or through any office of the Bureau of Foreign and Domestic Commerce. Price is 35 cents.

Mac's Coal Directory and Buyers Guide—The 1938 edition of this annual publication is arranged in six major sections. Section I includes several different listings of coal selling companies; Section II, listings of coal operating companies and coal shipping mines; Section III, trade names of coal; Section IV, coke plants; Section V, coal operating companies—alphabetically by states; and Section VI, a buying section. There also are two special sections, one covering B. & O. Coals and the other, Mac's Directory and Handbook of Anthracite. The book, copyrighted 1938 by W. C. MacQuown, is published by The Coal Information Bureau, Inc., East Tower, Union Trust Building, Pittsburgh, Pa. It is priced at $10.00 a copy.

Procedure Handbook of Arc Welding Design and Practice—The fifth edition of this book has just been announced by the Lincoln Electric Company, Cleveland, Ohio. The handbook is re-issued each year to include all new data essential for more efficient use of arc welding in all its varied applications. The handbook, which contains 1,012 pages and 1,243 illustrations, is written especially for use of designers, engineers, architects, production managers, welding supervisors and operators and contains a wealth of data of interest to draftsmen, steel fabricators and erectors, foremen, cost estimators, maintenance managers, shipbuilders, etc. The eight sections of the book cover: Welding Methods and Equipment, Technique of Welding, Procedures, Speeds and Costs for Welding Mild Steel, Structures and Properties of Weld Metal, Weldability of Metals, Designing for Arc Welded Steel Construction of Machinery, Designing for Arc Welded Structures, and Typical Applications of Arc Welding in Manufacturing, Construction and Maintenance. The Procedure Handbook is bound in brown, semi-flexible simulated leather, gold embossed, and is 5¾x9 inches. Copies will be mailed, post paid, to any address in the United States for $1.50 per copy, foreign, $2.00 per copy.

The Paper Industry Safety Contest

July 1, 1937 to June 30, 1938
Cumulative Scores as of January 31
15 Mills Have Perfect Record

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
A	Container Corp. of America	Philadelphia	Pennsylvania
B			
C	Finch Pruyn & Co., Inc.	Glens Falls	New York
D	The Harriman Company	Harriman	Tennessee
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	United States Envelope Co.	Morgan Paper Co. Div.	Lititz, Pa.
	Rogers Fibre Co., Inc.	Bar Mills	Maine
	The Mead Corporation	Nashville Div.	Nashville, Tenn.
	Hollingsworth & Whitney Co.	Aroostook & Cobbossee Mills	Gardner, Maine
	International Paper Co.	Mill No. 23	Riley, Maine
	Alton Box Board Company	Carlyle	Illinois

Division II—Paper and Board Re-Manufacturing

Bird & Son, Inc.	Norwood	Massachusetts
Bird & Son, Inc.	Chicago	Illinois
Texas Corrugated Box Co., Inc.	Dallas	Texas
Bay West Paper Company	Green Bay	Wisconsin
Bemis Bros. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P-139	2	2	1.919
	P-108	3	7	4.379
	P-121	4	5	4.885
	P- 84	5	6	5.046
	P- 19	6	4	5.134
	P- 13	7	6	5.829
	P- 12	8	7	6.648
	P- 18	9	10	7.076
	P- 28	10	20	7.146
	P- 10	11	8	7.334
	P- 1	12	14	7.561
	P-136	13	8	8.430
	P- 97	14	6	8.562
	P- 21	15	8	8.594
	P- 69	16	10	8.884
	P- 30	17	8	9.527
	P- 9	18	18	10.700
	P- 23	19	9	12.013
	P- 11	20	12	13.624
	P- 62	21	17	13.680
	P-102	22	16	15.240
	P-107	23	11	15.374
	P- 27	24	43	15.684
	P- 73	25	26	15.835
	P- 64	26	15	16.439
	P- 67	27	29	17.266
	P- 40	28	30	24.886
	P- 87	29	41	30.018
	P- 32	30	36	38.222
	P-140	31	38	39.025
	P- 71	32	35	45.099
GROUP B	P- 22	1	2	3.045
	P-135	2	2	3.629
	P- 4	3	2	4.272
	P- 68	4	3	4.427
	P- 72	5	3	6.532
	P-133	6	4	6.594
	P- 58	7	4	6.946
	P- 60	8	5	8.035
	P-142	9	4	8.080
	P- 70	10	5	9.276
	P-128	11	7	10.288
	P-143	12	6	12.729
	P- 59	13	7	13.227
	P- 2	14	9	13.358
	P- 45	15	7	13.378
	P-112	16	9	14.139
	P-122	17	9	14.927
	P- 15	18	9	16.503
	P- 26	19	10	17.161
	P- 16	20	10	19.585
	P-123	21	11	20.156
	P-120	22	13	20.625
	P- 3	23	13	21.148
	P-137	24	11	22.587
	P-130	25	15	23.109
	P- 25	26	15	23.319
	P-124	27	16	28.294
	P- 82	28	20	33.077
	P-104	29	21	42.524

January Report Missing—Covers six months only:
P-27, P-71, P-119, P-29, P-138, R-5, R-22.

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP C	P- 55	2	1	2.537
	P- 89	3	1	3.213
	P- 43	4	1	3.976
	P- 88	5	4	10.818
	P-119	6	5	14.553
	P-113	7	4	14.935
	P- 61	8	5	15.470
	P- 37	9	5	16.293
	P- 46	10	7	17.447
	P- 52	11	6	20.135
	P- 94	12	5	20.996
	P- 47	13	7	28.240
	P- 14	14	6	28.476
	P- 33	15	9	29.502
	P-103	16	7	30.823
	P- 29	17	8	34.050
	P- 41	18	15	38.382
	P- 48	19	9	39.070
	P-111	20	12	40.747
	P- 34	21	13	45.269
	P- 17	22	11	47.560
	P- 80	23	16	61.308
GROUP D	P-129	9	1	6.290
	P-117	10	1	6.651
	P- 93	11	1	9.275
	P- 86	12	1	9.809
	P- 35	13	1	10.540
	P-141	14	1	11.128
	P- 50	15	2	11.741
	P- 42	16	2	15.795
	P- 91	17	3	16.769
	P-110	18	1	18.850
	P- 99	19	2	18.927
	P-106	20	3	19.558
	P-125	21	2	20.558
	P- 36	22	3	20.619
	P- 6	23	4	23.796
	P-116	24	5	23.924
	P-134	25	4	26.513
	P- 49	26	4	26.652
	P- 7	27	5	29.402
	P- 63	28	5	29.832
	P-138	29	4	30.330
	P- 81	30	5	30.703
	P- 98	31	4	32.593
	P- 65	32	3	33.729
	P- 38	33	3	39.042
	P-131	34	5	77.753

Division II—Paper and Board Re-Manufacturing

R-23	6	2	3.654
R-19	7	1	4.760
R-20	8	3	5.105
R-21	9	3	8.061
R-28	10	3	9.329
R-13	11	2	9.997
R-10	12	3	10.090
R- 5	13	7	13.488
R-11	14	1	15.271
R-24	15	7	22.341
R-27	16	5	23.403
R- 1	17	9	26.392
R- 9	18	5	32.976
R-22	19	2	34.677
R-26	20	9	37.936
R- 4	21	6	97.946

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Sight feed and hand force feed oiler; wrenches, spanners, etc., go with it. Descriptive circular, instruction booklet and blue prints for foundations included. Two semi-circular belt guards will be included if purchaser wants them. It is rated for speeds from 300 r.p.m. to 350 r.p.m. Maximum safety load 40 h.p. or 25 K.W. This engine was installed for emergency use. Perhaps was not run to equivalent of six months' use.

1—JUNIOR STOVER GASOLINE ENGINE, 8-10 h.p. Shipping weight 1350 lbs.

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1—200 HP West. CW. 600 R
1—200 HP West. CW. 500 R
1—150 HP G.E.Mt. 600 rpm.
1—104 HP G.E.Mt. 600 rpm.
2—75 HP West. CW. 600 R
1—75 HP Finn Wex. 1200 R
1—50 HP West. CW. 500 R

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1—300 HP West. 600 r.p.m
1—225 HP G.E. 600 r. 89%
1—100 HP G.E. ATI-900 R

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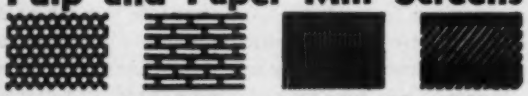

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◆ Arrange Special Group Meetings for Superintendents' Convention

This year there will be eight groups to hold special meetings at the 19th annual convention of the American Pulp and Paper Mill Superintendents Association, to be held June 22-24 at the Royal York Hotel, Toronto. The groundwood, book and fine papers, coarse papers and news and kraft groups will meet Thursday morning June 23. As of February 26, forty-seven spaces have been sold to the following exhibitors:

Booth	Company
1-2	Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
3	Taylor Instrument Companies, Rochester, N. Y.
4-5	Johns-Manville Co., New York, N. Y.
6	Chromium Corporation of America, Waterbury, Conn.
7	S. M. Langston Co., Camden, N. J.
8	Crane Co., Chicago, Ill.
9	L. H. Gilmer Co., Philadelphia, Pa.
10	Rice, Barton & Fales, Worcester, Mass.
11	Jos. T. Ryerson & Son, Inc., Chicago, Ill.
12	A. E. Broughton & Co., Glens Falls, N. Y.
13-14	Canadian Ingersoll-Rand Co., Ltd., Montreal, Quebec, Can.
15	Victaulic Co. of Can. Ltd., Toronto, Ontario, Can.
16	Barrett-Cravens Co., Chicago, Ill.
17	Paper Makers Importing Co., Easton, Pa.
21	Anaconda American Brass Ltd., New Toronto, Ontario, Can.
23-24	Foxboro Co., Foxboro, Mass.
25	Pulp and Paper Mill Accessories, Ltd., Montreal, Quebec, Can.
26-27	Arthur S. Leitch Co., Ltd., Toronto, Ont.
28-29	Paper and Industrial Appliances, Inc., New York, N. Y.
30-31	Link-Belt Co., Chicago, Ill.
32-33-33A	Hercules Powder Co., Wilmington, Del.
37	Rollway Bearing Co., Syracuse, N. Y.
38	Warren Steam Pump Co., Warren, Mass.
39-40	Nash Engineering Co., New York, N. Y.
41	J. O. Ross Engineering Corp., New York, N. Y.
42-43	Beloit Iron Works, Beloit, Wis.
44	Sturtevant Mill Co., Boston, Mass.
45	Duriron Co., Inc., Dayton, Ohio
46-47-48	International Nickel Co., New York, N. Y.
52	U. P. M.-Kidder Press Co., Dover, N. H.
58	Penick & Ford, Ltd., New York, N. Y.
59-60	Mason-Neilan Regulator Co., Boston, Mass.
62	Bauer Brothers Co., Springfield, Ohio.

◆ Interesting Program for Electrochemical Society Meet

At the coming Savannah Meeting of the Electrochemical Society, Inc., which will be held at the Hotel DeSoto, Savannah, Ga., April 27, 28, 29, and 30, 1938, there will be two important and timely symposia: Physical Chemistry in the Pulp and Paper Industry, and Industrial Electro-Osmosis. Besides these, there will be a session on Electrodeposition.

To date, the following papers have been accepted by the Publication Committee and are in print:

"Commercial Electrodeposition of Cobalt-Nickel Alloys," L. Weisberg.

"Electrodeposition of Copper, Nickel and Zinc from Cyanide Solutions," C. L. Faust and G. M. Montillon.

"Effect of Applying a Counter E.M.F. to a Leclanché Cell," K. A. Kobe and R. P. Graham.

"Overvoltage," H. Hunt, J. F. Chittum, and H. W. Ritchey.

"Anode and Cathode Weight Losses in Galvanic Corrosion," W. A. Wesley.

"Table of Electrochemical Equivalents," G. A. Roush.

"Transient Voltages at the Beginning of Discharge of a Storage Cell and Their Relation to the Actual and 'Transfer' Resistance of the Positive Plate," T. S. Cole.

"Motor-Electrolytic Potentials," E. Newbery and G. A. Smith.

"The Structure and Hardness of Electrolytic Chromium," M. Cymboliste.

"Study of Reaction Products and Mechanism in the Electrolytic Reduction of Ethyl Iodide," R. E. Plump and L. P. Hammett.

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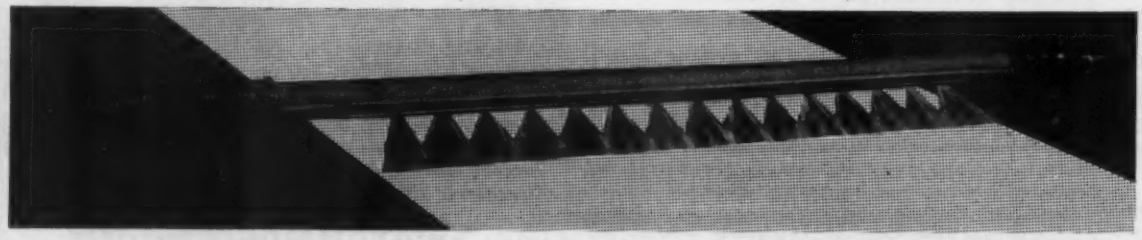

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"Electrical Charges of Aqueous Colloidal Systems," I. Kemp.

"Causes of Porosity in Electrodeposited Coatings, Especially of Nickel on Steel," A. W. Hothersall and R. A. F. Hammond.

"Alkaline Plating Baths Containing Organic Amines. Part II. Copper Plating from Solutions Containing Ethylenediamine," C. J. Brockman and John H. Mote.

"Chemistry of Bleaching Chemical Wood Pulps," John D. Rue.

"Comparison of Electro-osmosis, Electrophoresis, and Streaming Potential and Their Theoretical Significance," L. S. Moyer.

"Alkaline Plating Baths Containing the Ethanolamines. Part IV. Copper Plating from Monoethanolamine Solutions," C. J. Brockman and C. P. Tebeau.

"Electrodeposition of Manganese from Aqueous Solutions," W. E. Bradt and L. R. Taylor.

"Chemical Modifications of Cellulose," Louis E. Wise.

"Application of Osmosis to the Recovery of Caustic Soda Solutions Containing Hemicellulose in the Rayon Industry," Louis E. Lovett.

"On the Electro-Washing Process," Sakuji Komagata.

Of the above listed papers, six have already been distributed to members.

The following represents the general program for the Spring Meeting as developed to date by the Local Committee, Mr. Philip McG. Shuey, Chairman.

Wednesday, April 27th

7:30 p.m. Registration, Hotel DeSoto. Lounge, Lobby floor.

8:30 p.m. Meeting of the Board of Directors and Annual Business Meeting. Breakfast room, Lobby floor.

Thursday, April 28th

8:30 a.m. Registration, Hotel DeSoto. Lounge, Lobby floor.

9:00 a.m. Scientific-Technical Session, "Physical Chemistry in the Pulp and Paper Industry," Mr. Charles Carpenter, presiding.

12:00 noon. Luncheon, Electrothermic Division in charge. 20 minute after-luncheon talk on "Electric Furnace Phosphates." Main ball room, Lobby floor.

2:00 p.m. Leave Harris Street entrance, Hotel DeSoto, for Southern Cotton Oil Company.

3:30 p.m. Continue to Union Bag and Paper Corporation.

6:00 p.m. Dinner as you like.

7:30 p.m. Joseph W. Richards Memorial Lecture, open to the public. Speaker: Dr. Charles H. Herty, Director Pulp and Paper Laboratory. Main ball room, Lobby floor.

9:00 p.m. Leave Harris Street entrance for boat trip on historic Savannah River. The boat will sail around the harbor and then proceed down the river to the bell buoy, which is just across the Bar in the Atlantic Ocean, marking the entrance to the Savannah harbor. Refreshments, entertainment, and dancing.

Friday, April 29th

9:00 a.m. Scientific-Technical Session, "Electrodeposition," and "The Electric Furnace," Division Chairmen presiding.

12:00 noon. Luncheon, Electrodeposition Division in charge. Luncheon talk on "Chromium Plating for the Paper Industry," by Mr. D. H. Bissell of the Chromium Corp. of America.

2:00 p.m. Leave Harris Street entrance, Hotel DeSoto, for visit to the Pulp & Paper Laboratory of the Industrial Committee of Savannah, Inc., and the Reliance Fertilizer Company and Savannah Sugar Refining Corp.

7:30 p.m. Dinner-dance at the Hotel. Presidential address by William G. Harvey. Award of prizes, etc.

Saturday, April 30th

9:00 a.m. Scientific-Technical Session, "Industrial Electro-Osmosis," Prof. H. Jermain Creighton, presiding.

12:30 p.m. Luncheon, Electronics Division in charge. Luncheon talk on "Applications of the Cathode-Ray Tube." Main ball room, Lobby floor.

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3:00 p.m. Leave Harris Street entrance, Hotel DeSoto, for trip to Savannah Beach where bathing can be enjoyed in the Atlantic Ocean, after which a shore dinner will be served at the Hotel Tybee. This trip to the Beach will be along Victory Drive which was so named as a memorial to the members of the American Expeditionary Forces from Chatham County who died in the World War. This drive, together with the boulevard to Savannah Beach, is said to be the longest avenue of palms in the world. Interspersed between the palms are thousands of multi-colored azaleas and oleanders. On the way to the Beach, a side trip will be made to Fort Pulaski. This is an historic Fort and a National Monument. The Fort was a defence of Savannah, and was used by both sides during the War between the States. It was named for Count Casimir Pulaski who lost his life in the siege of Savannah during the Revolutionary War. It cost $1,000,000 to construct the Fort, which began in 1829. This was Robert E. Lee's first assignment after his graduation from West Point.

6:00 p.m. Shore dinner at Savannah Beach. Adjournment.

Plant Inspections

As indicated above, a number of unusually interesting plant visits have been arranged for the Savannah Meeting. Members will be given an opportunity to inspect the following plants: The Southern Cotton Oil Company, which purifies cottonseed oil in one of the largest refineries in the country and manufactures Snowdrift, salad oils, paints, roofing tar, cottonseed cake, meal, and hulls; the Union Bag and Paper Corporation, which is one of the largest sulfate pulp and paper mills in the world, employing more than a thousand persons and manufacturing twelve million bags daily; Dr. Herty's far-famed Pulp and Paper Laboratory of the Industrial Committee of Savannah, whose investigations of the possibilities of slash pine in making paper pulp have led to Savannah's keen interest and development in this industry; the Reliance Fertilizer Company, one of the foremost industries in Savannah; and the Savannah Sugar Refinery, with a melting capacity of 2,500,000 pounds of raw sugar daily.

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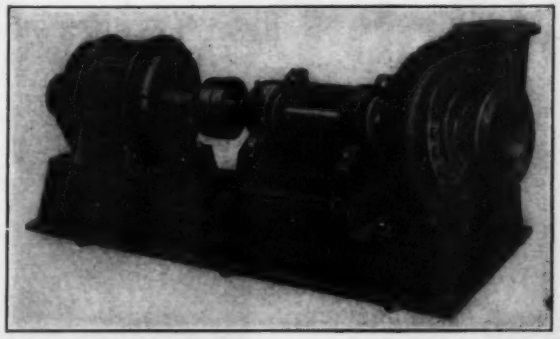

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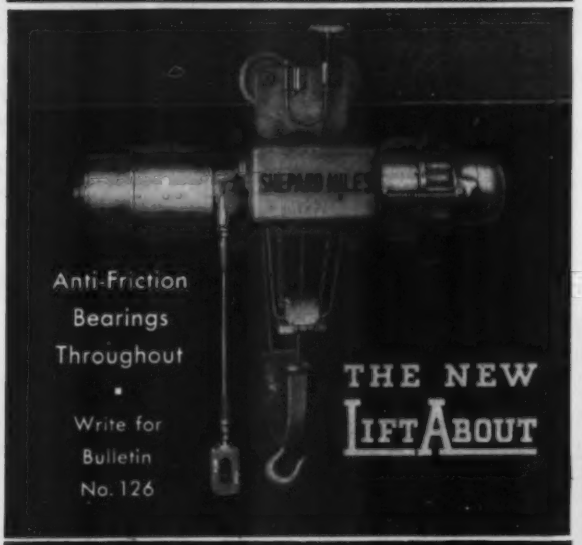

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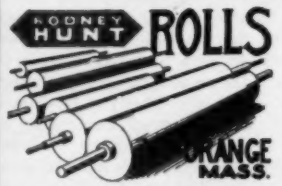

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POWER

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This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worthwhile practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Clean Boiler Surfaces

High boiler efficiency is obtained only when the heating surfaces are clean both inside and out, the setting is tight, the joints do not leak and the load is carried at the point of maximum efficiency.

On the inside of the boiler, the heating surfaces become coated or scaled with sludge due to impurities which enter with the feed water. It is, therefore, advisable to treat the water before it is fed to the boilers in such a way as to prevent scale-forming material from entering the boiler, if this method is practicable. In a small plant, however, expense will not always permit this treatment, and it has become customary to change the form of the impurity so that instead of forming a hard scale in the boiler, a precipitate is formed, which may, to a great extent, be removed through the blow-off valve or by means of a skimming device which takes off the floating precipitates.

No matter how much care is taken, however, to supply the boiler with pure or treated water, more or less scale will accumulate, and must be removed periodically, if a high efficiency of the boiler is to be maintained. Once scale has been formed, it is necessary to open the boiler and remove it mechanically. Two general types of tube cleaners are available for this purpose; one sets up a vibration of the tube metal by rapid hammer-like blows from a cleaner which is pushed through the tube at a moderate rate. This type of cleaner will do satisfactory work with both water-tube and fire-tube boilers. The other type, adaptable only to water-tube boilers, chips the scale from the tube by means of rapidly rotating spurs driven by steam water, air or electricity. For cleaning the interior shell of a return tubular boiler, it is necessary to use a hammer and chisel, or if the scale is not hard, a scraper may do the work.

◆ Effect of Cooling Water Temperature on Condenser Operation

As the temperature of the cooling water is lowered, less water is required. This may result in two conditions: 1. With the high vacuum resulting from low cooling water temperature, the reduction in turbine steam consumption per unit increase in vacuum becomes small in many turbines. 2. The higher the vacuum, the greater is the reduction in condensate temperatures per unit increase in vacuum. A point is sometimes reached at which the increase in cost of heating the condensate water becomes as great as the saving due to the operation at the improved vacuum. Before this point is reached, the volume of cooling water should be reduced.

Variations in the quantity of cooling water tend to affect the vacuum in two ways: 1. By varying the velocity of the water flow in the tubes. 2. By varying the mean circulating water temperature. The vacuum in a surface condenser is determined by the mean circulating water temperature and the mean temperature difference between the steam and water that is required to cause the transfer of heat. This mean temperature difference varies with the amount of heat to be transferred and the resistance to heat transfer. The resistance to heat transfer is affected by the presence of air on the steam sides of the tubes, by the amount the tube surfaces are fouled with slime or scale, and by the velocity of the cooling water.

◆ When Sketches and Notes Are Important

Many an engineer insists upon keeping the plant under his care so that it presents a pleasing appearance. He is proud of the results he is getting; the CO_2 being high, maintenance costs low and the indicator cards from his engines look as though they had been hand drawn upon the basis of theory alone.

This same engineer, however, cannot or will not make sketches or notes so that they are intelligible to anybody else, or to himself when they are but a few weeks old. If he does make an attempt at making such records his method of filing them for future reference is not at all in keeping with the way in which he operates the plant.

Because a repair job has been performed once, it is no assurance that it will not have to be done again. Further, a change which has been made may not prove satisfactory and it may be advisable to change back to the original scheme. Without a good system of sketches and notes, much work must be duplicated and often details of the greatest importance depend upon the memory of the one man who performed them. Guessing has no place in power plant operation and still, without records, it must be resorted to.

It is a credit to any engineer to have with him in his work or to leave behind him a well kept set of clear, definite and comprehensive sketches and notes of the work, which has been done and work which he believes will improve operation.

◆ HOLES IN BAFFLES WHICH APPEAR SMALL may cause losses due to excessive flue temperature of as much as 5 or 6 per cent and there are few places in the average boiler plant where such large returns can be obtained from so small an expenditure in money and effort as is possible from keeping the baffles tight. After a tile baffle has gotten in bad shape, it is difficult to make a good job by patching with new tile. The best way for repairing a leaky baffle is to plaster up the holes with high temperature cement applied by means of a cement gun.

◆ Fine Spray May Cause Blanketing

It is generally believed that the finer the spray emitted by a nozzle the better the resultant cooling. It may be true that a nozzle with a very fine spray will give slightly better cooling than one with a coarser spray; still, when nozzles are collected in large groups the spray may be so fine as to produce a blanketing effect which will exclude the air from the center nozzles and thus produce poorer overall results than could be obtained from nozzles with a somewhat coarser spray. The fineness of spray must also be considered where driftage, due to wind, is likely to be serious, as in congested districts, or where the makeup water is limited. Generally speaking, the finer the spray and the higher the distance the spray is thrown, the greater will be the loss due to driftage.

◆ PASTE, TAR, OR LACQUER can be removed from machines and tools by using a mixture of 4 oz. benzol, 3 oz. fusel oil, and 1 oz. alcohol. This mixture should be applied, allowed to stand about ten minutes, and then rubbed off with waste.

◆ Turbine Steam Piping Should Be Checked

Steam piping to a turbine does not, as a rule, need much attention. If erected correctly when installing the turbine, so that no undue strains are set up, there is little to do beyond keeping the joints steam tight. It is wise, however, to check over the piping to see that the supports are properly carrying the weight and that the expansion is not causing distortion of the turbine.

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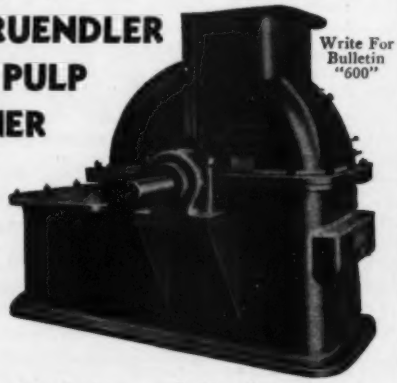

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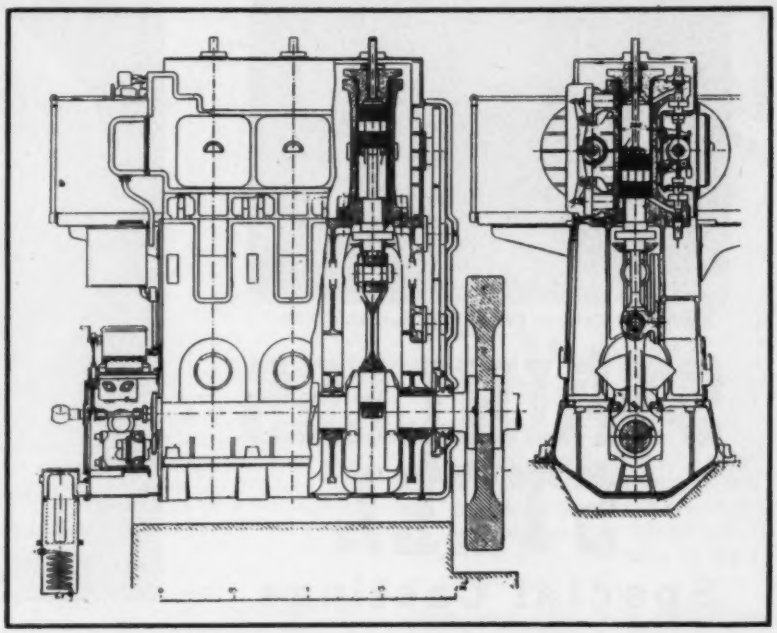
TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

IN THE PAPER INDUSTRY

◆ High Pressure Steam Engine

The figure shows a reciprocating engine developed in Switzerland which competes with turbines of 500-3,000 b.hp. outputs, which take steam pressures up to 1,400 pounds per square inch and which work against a comparatively high back pressure. The new steam engine develops 1,500 hp. at 500 r.p.m., with an initial pressure of 1,350 lb. and a back pressure of 142 lb. per square inch. This drop in pressure is achieved in one expansion in three double-acting uniflow cylinders working in parallel. The exhaust steam, at 142 lb., is used to operate a manufacturing plant, and claim is made for an increased efficiency over a previously installed turbine plant (operating against the same back pressure). Engineer, Paper-maker and British Paper Trade Journal (Tech. Section) 94, No. 5, 162, (1937).



◆ Filler Retention

The stock density or the actual concentration of filler does not seem to influence the retention. In order to obtain the best retention of fillers, the authors found that the sequence in which components are added to the beater (after beating of stock) was important. Two sequences are proposed: (a) size; alum; filler; and (b) filler; size; alum. Of these (b) appears to be the most economical and is recommended. When a laboratory kollergang was used, before beating, no effect on filler retention was noted. However, no generalizations regarding the effects of such pretreatment can be made.

The Sven method resulted in the best retention of fillers. Here a dilute glue solution is added to the pulp suspension just before it flows on the wire of the paper machine. This technique does no damage to the finished paper sheet. There is probably a coagulating effect (which is electrochemical) which functions just before sheet formation takes place. Addition of animal size to the beater seems to have no effect on retention of filiers. W. Brecht and R. Rausch. Papier-Fabr. 35, (Tech. Tl.) 449-55 (1937).

◆ Chemistry of Spruce Knots in Relation to the Sulphite Cook

The knots, many of which were obtained from boards, were carefully analyzed. The marked differences between their composition and that of compression wood and normal wood may be gathered from the accompanying table on resin-free samples:

	Per cent in knots	Per cent in red compression wood	Per cent in normal wood
Lignin	33.0	38.8	28.6
Acetyl and formyl	1.1	0.8	1.4
Mannan	9.2	4.0	10.8
Galactan	10.1	0.0	0.7
Levulan	0.0	0.9	1.9
Pentosan	6.6	6.6	5.4
Glucuronic acid	5.5	not det'd.	not det'd.
Cellulose plus glucan	31.2	46.9	48.3
Ash and residue	3.3	2.0	2.9

The methyleneoxide and methoxyl content of knotwood approximated that of normal wood. The greatest difference noted was the exceedingly high hemicellulose content of knotwood (32-33 per cent), and the presence of large quantities of galactans. The fiber length of knotwood is only about 1 mm. (width 0.23). Knotwood is high in resinous material—about 15.4 per cent, of which 8.05 per cent are ether extractives and 7.34 per cent are acetone soluble matter. The usual sulphite cook serves quite well to delignify knotwood which has been previously freed from resins. Provided a two stage digestion is used, in which in the first stage sodium sulphite, and in the second stage sodium bisulphite and SO_2 are employed, even a high resin knotwood may be readily pulped. By the latter process, pulp with a Roe chlorine number could be attained without black cooking. Paper made solely from this pulp, however, has no strength and is commercially valueless. Its felting properties are very poor. Original knotwood (that still holds the resin) cannot be delignified by the ordinary cooking liquors. Removal of lignosulphonate is inhibited by resin, and black cooks are the result. There does not seem to be any appreciable difference in the superficial composition of lignin of knotwood and that of normal wood. Erik Hägglund and Sten Larsson. Papier-Fabr. 35, (Tech. Tl.) 475-481 (1937).

◆ Lignosulphonic Acid in Sulphite Pulp

Residual lignosulphonic acid in pulp is extracted with pure methanol, after the following course of treatment. The pulp is disintegrated with water, and then treated several times with 0.2 N HCl to replace metallic ions by H-ion. It is then washed with water, and finally extracted with methanol at its boiling point (under reflux condenser). The stages of extraction were followed by determining the so-called acid number. This is carried

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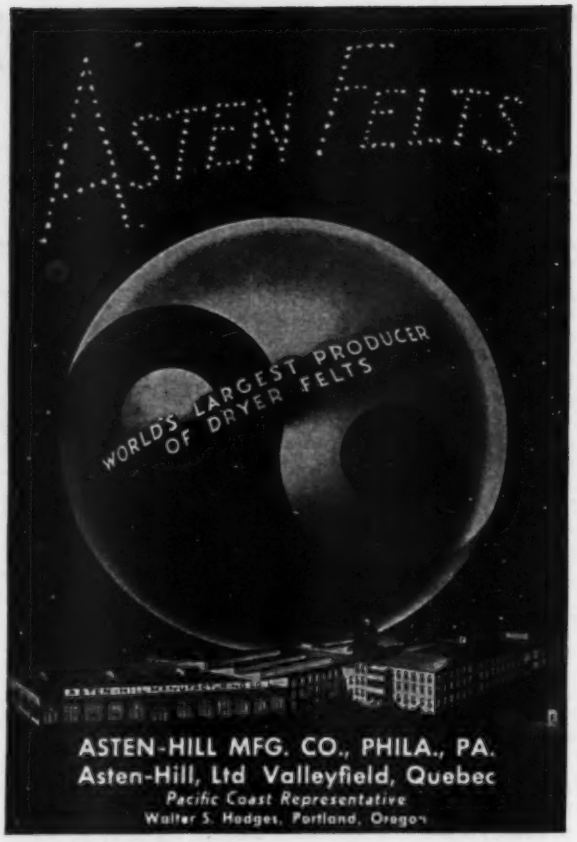

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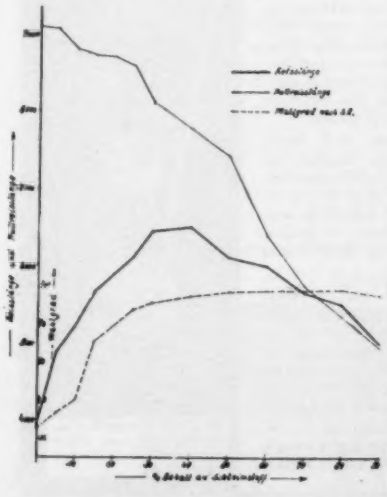
out by treating a sample of the pulp with N. NaCl, and then titrating the amount of HCl freed by this interaction. The acid number is then expressed in terms of numbers of c.c. of 0.01 N acid generated by 1 gram of pulp. A series of experiments showed that this acid number is an approximate function of the methoxyl content, and therefore serves as a measure of the lignin content. The significance of this is that hitherto direct lignin determinations in pulp have led to results that were untrustworthy. If various sulphite pulp samples are taken in a series of cooks (where cooking conditions were comparable) the ratio of acid number to methoxyl was nearly constant in each individual sample. While it is admitted that lignin may attain different degrees of sulphonation and although such variations in sulphonation naturally influence the acid numbers markedly, under practical cooking conditions, carried out with sulphite liquor used in the pulp industry, the ratio of acid number to methoxyl still remained approximately constant. The rate of solution of lignosulphonic acid in methanol could be followed quite accurately by acid number determinations, especially where one specific type of sulphite pulp was used in a series of experiments. In the original, the author describes his experiments in great detail. Carl Kullgren. Svensk Kemisk Tidskrift, 49, 65 (1937) through Papier-Fabr. 35, (Abstracts) 173 (1937).

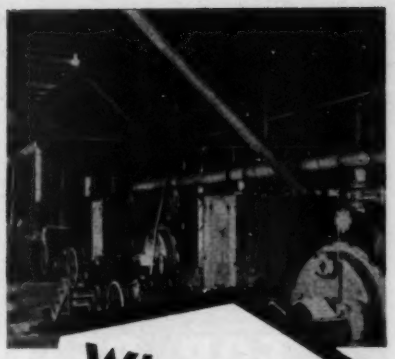
◆ Fiber Length—Slime—Degree of Beating and Pulp Properties

A comprehensive investigation carried out in the Central Laboratory of the A. Z. W. at Pirna on the effect of fiber length and of slime (produced by dead-grinding, or widespread mechanical degradation of fiber) on the degree of hydration and on the tensile strengths of beaten pulps. Fully tabulated data (27 tables) are given together with 16 cor-



responding graphs (only one of which can easily be reproduced here). The following conclusions are reached: (1) the state of hydration of a beaten pulp cannot be precisely defined by the use of any method that depends in principle on the rate with which water is drained off. This was demonstrated in a number of instances. The following are all examples in which the stock showed a beating of 75 deg. S.R.: (a) unbeaten pulp plus 25 per cent fiber-slime; (b) fibers (hydrated in a pebble mill) with average fiber length of 0.74 mm. plus 15 per cent fiber slime; (c) fibers ground to 0.35 mm. average length without addition of slime. It is evident that a term like "deg. S.R." is entirely inadequate in defining the actual state of beating. The sensitivity of the Rapid-Köthen sheet machine in recording time of drainage is lower for low degrees of beating, but much greater for high degrees of beating than is the sensitivity of the Schopper-Riegler apparatus. The behavior on beating of a pulp is contingent on the slime content, the mean fiber length, and the felting qualities of the fibers. The so-called slime content may be determined accurately as that fraction which passes the finest (#160) screen of Schmidt's screen analyzer (literature reference not given). The average fiber length may be determined by counting measurement by the technique devised by Steinschneider and his coworkers (cf. Papier-Fabr. (1936) No. 23, Tech. Tl. 177-83). The felting qualities of individual fibers, which are dependent on defibrillation and roughening of the surfaces of such fibres cannot be quantitatively determined. However, a prognosis may be made whether a certain pulp has (or has not) good felting qualities by gauging the degree of beating, the slime content, and the mean fiber length.

The breaking length depends on the tensile strength of individual fibers, on the felting properties of the beaten stock and on a third factor which the authors propose to term compressibility of the fibers. Of these, only the first can be given numerically by determining the so-called zero-breaking length (Nullreisslänge) which is proportional to the mean tensile strength of individual fibers. (This zero breaking length, which is separate and distinct from the "breaking length", is defined as the length at which a paper strip breaks in a special instrument devised by Günther, Papier-Fabr. (1931) No. 19, 290-99, and which was used by the present authors). However, this zero breaking length is proportional to tensile strength of single fibers only when the degree of beating is low. With a very slow pulp in which the slime content is high, this proportionality ceases. Beating in the Jokro and pebble milk (which are quite similar in principle) consists primarily in a crushing action and only secondarily in shortening the fibers. Hydration in a Rieth-hollander consists in a cutting action through the agency of grinding discs. This causes a shortening of the fibers, without roughening their surfaces and defibrillation. This results in an increase in slime and a lower mean fiber length, a lower zero-breaking length, lower felting properties and lower breaking lengths. Up to about 40 per cent of the total stuff content, fiber-slime exercises a cementing action on unbeaten fibers, which shows as an increase in breaking lengths up to a maximum. When the fiber-slime exceeds this point, however, the breaking lengths begin to drop.



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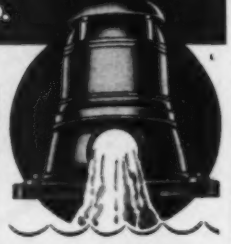

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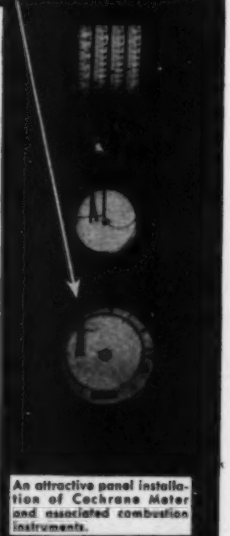

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Despite this the decrease in breaking length is not as low as breaking lengths with stocks consisting of unbeaten fibers totally free from slime (even where the ratio of slime to fiber is 9:1). When only fiber slime is present, sheet formation becomes impossible. The zero-breaking lengths, however, show a decrease, even when very small amounts of slime are present in the stock. This is accounted for by the fact that slime has practically no tensile strength, and that the number of fibers (capable of supporting a weight) is decreased per unit area of sample sheet. Shortening of the average fiber length increases the breaking length at first, due to increased density of the sheet.

Only with very extreme shortening of the fiber does the breaking length show a decrease. The zero-breaking length is not lowered simply by shortening the fibers. However, clean-cut correlations are impossible since such shortening is generally accompanied by roughing of the surface, a decrease in fiber cross-section with a lowering in tensile strength of individual fibers. By fiber-length measurements, the state of hydration may be determined. This state of hydration (Mahlungszustand) of stock beaten in different types of equipment thus furnishes an explanation for the respective variations in strength measurements in sheets made from these pulps. The close relationship between mean fiber length, slime content, degree of beating. and strength values becomes apparent from the author's thoroughly evaluated data. In the figure, the breaking length (a) (Reisslänge) and the zero-breaking length (b) (Nullreisslänge), and (c) degree of beating in deg. S.R. (Mahlgrad) are plotted against the fiber-slime content of a pulp in percent. Of these, (a) is the heavy line solid curve, (b) is the light line solid curve, and (c) is the broken line curve. M. Steinschneider and E. Grund. Papier-Fabr. 36 (Tech T1) 1-21 (1938).

◆ Nickel Alloys Used in Paper Manufacture

While this is in the main a descriptive article with little new material, (C.f. THE PAPER INDUSTRY, (Technical Developments), June 1935, p. 199) is serves to assemble comparative corrosion data on various nickel alloys, and makes detailed reference of the use of such alloys and their resistance in various parts of the mill. Besides pure nickel, the following alloys are described: (1) Monel metal; (2) nickel-plated steel; the so-called (3) non-oxidizing steel containing 18 per cent chromium and 8 per cent nickel; (4) cast Ni-resist (containing about 14 per cent nickel, 7 per cent copper and 2-4 per cent chromium); (5) nickel castings; (6) Inconel (80 per cent nickel, 14 per cent chromium and 6 per cent iron); (7) nickel-chromium alloys; (8) aluminium-nickel bronze (containing 89 per cent copper, 3 per cent nickel and 8 per cent aluminium); and (9) other nickel containing steels. In groundwood production, gears of (9) and (5) have been found useful. Flat or cylindrical pulp screens are often made of (1), which appears much more durable and serviceable than bronze. (In this connection, screens made with Monel "K" (which contains 4 per cent aluminium and the hardness of which is about 3.15 Brinell) are described.) Figure 1 shows the construction of the cylindrical screens, made entirely of Monel metal, illustrating the supporting bars (barres de soutien), the covering of Monel wire (fil en Monel), and the outer covering of Monel metal cloth (toile metallique (dessus)). In the manufacture of chemical pulp, (9) may be used in the chippers. A suggestion is made that (2) might well be used in digester shells. In soda pulp thickeners (4) is indicated. In soda recovery, where corrosion becomes a very important problem, (1) may be used advantageously in filtration. In evaporators, pure nickel is often used (as well as (1)) in the tubes. Their life contrasts with that of copper or steel which require frequent replacements. The following data show the rate of corrosion (carried out during a 16 day period in an evaporator contrating 30-50 per cent NaOH at 80 deg. C., the results being given in milligrams lost per sq. decimeter per day):—Pure nickel, 0.6; Monel, 1.2; copper-nickel-zinc (75/20/5) 3.1; copper, 14; steel, 20; cast iron, 35; chrome-steel (with 14 per cent chromium) 180.

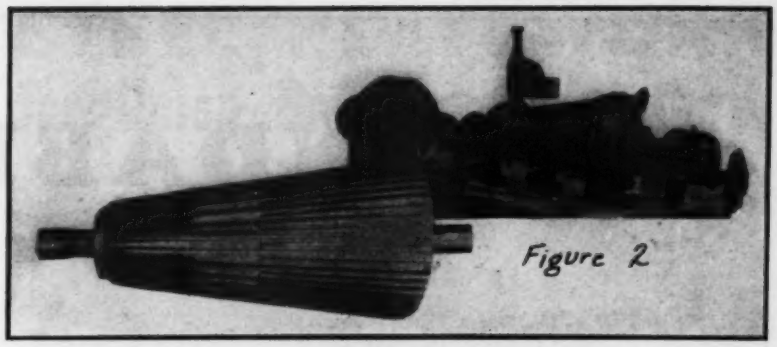
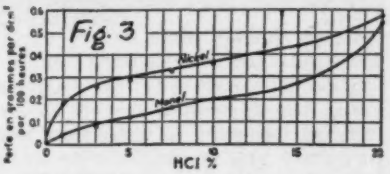


Figure 2

In soda furnaces, due to heat-resistance as well as resistance against corrosion (4) is often used. In the sulphite process, in leading the SO_2 from the burners to the cooler at those points at which condensation and corrosion occurs (4) is used in short length, whereas the rest of the cooler can utilize cast pipe low in nickel and chromium. The use of nickel alloys in other parts of process is also discussed briefly. In cooking straw or esparto, (1), (4) and (2) are used at various points of the operation. In the manufacture of fine rag paper, bronze may often be advantageously replaced by (1) or (3). In the refining and beating operations, nickel alloys are often used. These uses need not be given in detail, but the author has furnished (half-tone) illustrations in which such alloys have been used with little corrosion or abrasion after years of service. For example, the blades of a Jordan made of (1) were in service for 11 years (cf. Figure 2). Monel K would show an even greater resistance. A new technique for defibration utilizes various types of fine filters, some of which use metal cloth. Here nickel alloys are useful because of their resistance to corrosion. The circulation of the corrosive bleach liquor is facilitated by using alloys containing about 58 per cent nickel (besides molybdeum, chromium, tungsten and iron) in pumps, pipes, valves and coupling. In making rosin size (1) may be employed. In the case of the beater, the various parts which may profitably be constructed of nickel alloys are discussed at some length. This is also true for various feed pumps. In a centrifugal pump handling alum solutions, a shaft made of (1) showed no corrosion after 2.5 years of service, while in the same pump steel shafts had to be replaced after several weeks, and a bronze shaft had a life of 6 months. This is



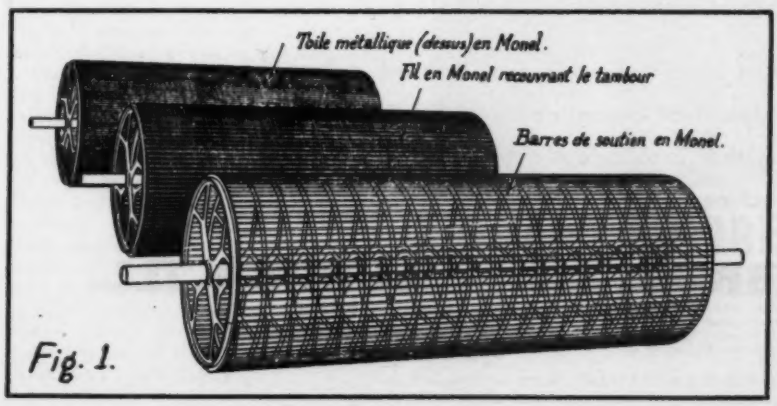


Fig. 1.

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simply a typical example. Troughs containing alkaline solutions (like water glass) when constructed of (1) gave long service. The use of nickel alloys in pulp thickeners, and in sizing and coloring, is also outlined. In Figure 3, two graphs show the loss in grams per sq. decimeter in 100 hours, plotted against concentration of HCl (figures useful in determining resistance toward bleach containing free HCl). It is obvious that for low concentrations (1) is more resistant than is pure nickel. At high concentrations (which are never even approached in the paper industry) the curves approach each other. Even for a 20 per cent HCl solution, however, neither nickel nor (1) causes a loss of 0.6 g/dm²/100 hours. The resistance of (1) to papermakers alum may be gaged from the following figures in which a sample was placed in a 20 per cent solution at 45 deg. and 35 deg. C. respectively during 1464 hours. In the first case where the immersion was intermittent, a decrease of thickness computed as 0.11 millimeters per year was noted. In the second case, where immersion was continuous, the diminution of thickness was calculated as 0.075 mm. per annum.

The author gives in detail the use of nickel alloys in the paper machine, and in calenders. The entire article is well-illustrated. Many of the installations referred to emanate from plants in the U. S. A. A similar but less comprehensive article (in German) has been published in Svensk Pappers-Tidn. 40, 460-3 (1937). R. W. Muller. Papeterie 59, No. 1 9, 906-18; 921-2 (1937).

◆ Paper Plasticity and Elasticity

Whenever a paper is high in plasticity, its elasticity is low. Both properties depend on particle displacement within the structure of the formed paper sheet. Both properties may be respectively different, in various parts of an individual sheet, due to lack of uniformity (in moisture content, etc). The fact that paper may be folded shows that particles in an air dried sheet can be displaced. The molding of pulp, and the embossing of paper (both of which require a certain moisture content) are contingent on plasticity. A dense and uniform structure is required in wrapping paper, and its elasticity depends on these structural properties of the sheet. A uniform but loose structure is essential in papers that are to be embossed, for here the particles within the sheet are to be displaced, and should have enough room to retain their new positions after embossing without causing strains. Some of the disadvantages of plasticity in non-uniform sheets are warping and curling, cockling and irregular contractions and expansions. These faults manifest themselves more especially when the sheet composition varies, and where the structure lacks uniformity. Variations in moisture in the same sheet (which may be the result of non-uniformity of sizing) is one of the factors giving rise to these difficulties. Paul Klemm. Wochbl. Papierfabr. 68 (Tech. Tl.) 916-8 (1937).

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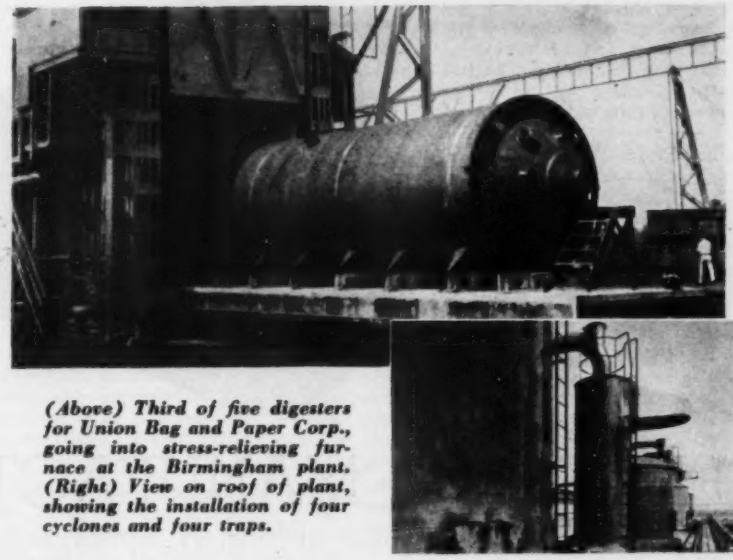

(Above) Third of five digesters for Union Bag and Paper Corp., going into stress-relieving furnace at the Birmingham plant. (Right) View on roof of plant, showing the installation of four cyclones and four traps.

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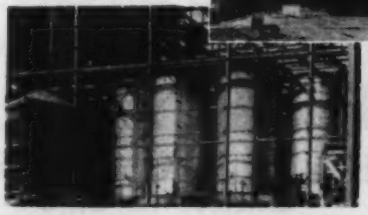
(Right) Field-erected liquor storage tanks of welded construction. (Below) Diffusers for Union's second paper making unit.

(Below) View inside building showing diffuser tops in near foreground and a row of 9 liquor measuring tanks in the background.



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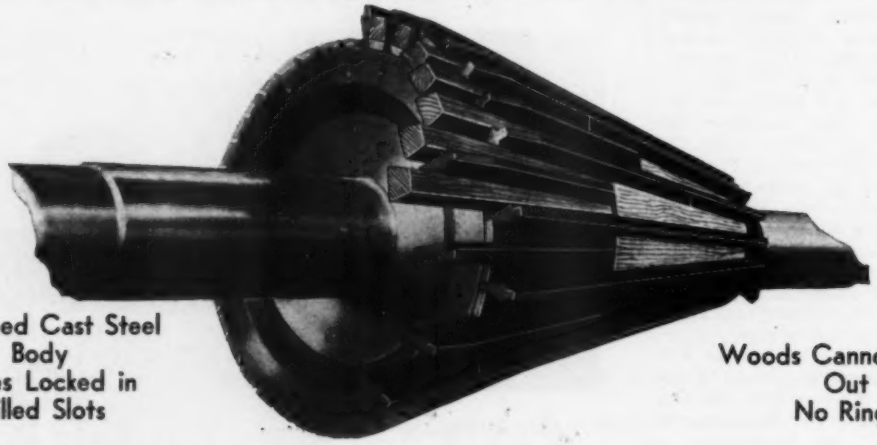

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2,103,640—Paper Manufacture. George A. Richter, Berlin, N. H., assignor to Brown Company, Berlin, N. H., a corporation of Maine. Application March 30, 1935, Serial No. 13,989. 4 Claims. (Cl. 91—68). A method of producing a water-absorbing paper product of high wet-strength, which comprises impregnating a highly porous paper body substantially uniformly throughout with a dilute organic solvent solution of a water-repellent cellulose ester in such amount as to incorporate into said body about 0.5% to 2.0% of said cellulose ester, based on the dry weight of said paper body, and removing the organic solvent from the impregnated paper body and depositing said cellulose ester therein from solution in an attenuated and discontinuous film such that water brought into contact with the resulting paper product spreads by capillary action to the bodies of the fibers as well as entering the pores and interstices in said paper body.

2,103,896—Machine for Disintegrating Screening, and Pumping Fibrous or Paper Making Stocks. William T. Doyle, Boston, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company, Boston, Mass., a corporation of Massachusetts. Application December 12, 1935, Serial No. 54,054. 9 Claims. (Cl. 92—20). A centrifugal pump for effecting a disintegrating and screening action on aqueous fibrous stock fed thereinto, comprising a substantially cylindrical internal wall defining a disintegrating and pumping chamber and comprising a substantially imperforate sector and at least two peripherally successive but separate discharge sectors each containing discharge openings and each leading into an independent discharge compartment, the openings in one sector being larger than those in the other, a blade-carrying rotor within said chamber capable of developing under rotation pumping pressure on stock fed into said chamber and of causing an emission of a relatively fine stock fraction radially through said discharge sector containing the smaller openings and a relatively coarse stock fraction radially through said discharge sector containing the larger openings, said discharge sectors constituting only a portion of said cylindrical internal wall and the remainder of said wall being substantially imperforate and occupying at least about 120°, and means for feeding said stock into said chamber substantially axially thereof.

2,104,025—Decalcomania Paper. Lewis Davis, Worcester, Mass., assignor to McLaurin-Jones Co., Brookfield, Mass., a corporation of Massachusetts. Application August 23, 1934, Serial No. 741,121. 9 Claims. (Cl. 41—33). A decalcomania paper comprising a suitable backing sheet, an outer waterproof coating carried by said sheet to take decalcomania printing, and a protective coating of a rubbery nature between the first mentioned coating and said sheet.

2,104,996—Manufacture of Corrugated Paper. Charles Quincy Ives, Reading, Mass., assignor to Sherman Paper Products Corporation, Newton, Mass., a corporation of Massachusetts. Application March 11, 1937, Serial No. 130,363. 11 Claims. (Cl. 92—70). A method which comprises forming a paper sheet from a paper making furnish containing, besides cellulose fiber, leather fiber in substantial amount; and corrugating the resulting paper sheet under sufficient heat to cause incipient fusion of said leather fiber.

2,105,052—Process for Manufacturing Paper. Johan Oltmans, Groningen, Netherlands. Application April 22, 1936, Serial No. 75,887. In Great Britain and France October 8, 1931. 7 Claims. (Cl. 92—21). Sized paper containing up to 5 per cent by weight of a cold swelling starch which is uniformly distributed throughout the paper; said cold swelling starch having been obtained by subjecting 1 part of raw starch mixed with 0.5 to 2 parts by weight of water to heat and pressure whereby said raw starch is simultaneously subjected to heat above the gelatinization point and to pressure so as to burst the starch granules and forming cold swelling starch granules of substantially larger size than the granules of said raw starch, said cold swelling starch being present as an irreversible colloid little affected by moisture and temperature changes, said paper being resilient having high folding, Mullen and tearing strengths and being non-picking when printed.

2,105,440—Manufacture of Metal Coated Paper. Bert C. Miller, Montelair, N. J., assignor to Bert C. Miller, Inc., New York, N. Y., a corporation of New York. Application August 30, 1935, Serial No. 38,552. 9 Claims. (Cl. 204—6). The process of continuously removing a layer of electrodeposited metal from a moving cathode when the metal is so thin that it does not possess of itself enough strength to withstand the tension necessary to pull it off the cathode, which comprises pressure contacting the layer of metal on the cathode with a tensioned flexible fibrous foundation which is stronger than the metal layer and with an adhesive which is permanently flexible, uniform, and reasonably hard when set, moving the cathode with the adhering metal layer and foundation while maintaining tension on the fibrous foundation until the adhesive sets enough to permit the foundation and metal layer being pulled off together and then stripping by tension applied in major portion through the foundation to strip the metal layer from the cathode without the aid of any stripping knife or chemical film being applied between the cathode and metal layer to facilitate its removal.

2,106,096—Art for the Treatment of Tissue Paper. Grover C. Hoffman, New York, N. Y., assignor of one-half to Helene de Bourgogne, New York, N. Y. Application September 28, 1935, Serial No. 42,573. 2 Claims. (Cl. 91—68). The process of treating tissue paper which consists in saturating the paper with a solution comprising two parts of ethyl alcohol, one part of glycerine with three parts of water, and containing five and one-half ounces of talcum powder in suspension in six gallons of the solution, then passing the treated paper between wringer rolls, while saturated, and finally drying it.

2,106,339—Varnish and Paper Drying Machine. Maxime J. Brizard, San Francisco, Calif. Application November 25, 1935, Serial No. 51,384. 4 Claims. (Cl. 34—12). In a device of the character described, an elongated box-like structure, a second box-like structure forming a vacuum box positioned in said first-mentioned box-like structure in such a manner as to form channels at the side of said first mentionel box-like structure, slits formed in the top of said vacuum box, said slits being diagonally disposed with relation to the length of the chamber, means for conducting sheets of material through said machine and over said vacuum box and slits therethrough, and means for directing a current of air downwardly on said sheets.

2,107,430 — Corrugated Paperboard Making Machine. George W. Swift, Jr., Bordentown, N. J., assignor to George W. Swift, Jr., Inc., Bordentown, N. J., a corporation of New Jersey. Application April 16, 1935, Serial No. 16,542. 1 Claim. (Cl. 154—30). A corrugated paper double-backing machine, having an upper series of flexible endless friction-conveyor members disposed side by side across substantially the entire active width of the machine, and with their lower passes in position to overlie and frictionally advance the upper surface of a corrugated paper web traveling through the machine, a driving roll around which said frictional conveyor members run, and an idler roll located at the entrance end of the machine around which said frictional conveyor members

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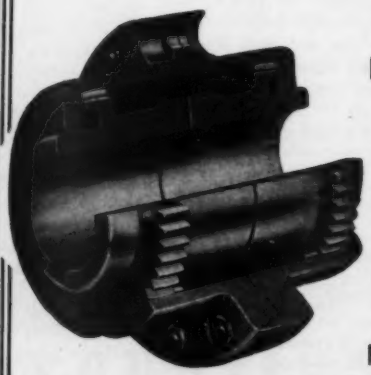

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also run, means being provided whereby the position of said idler roll may be adjusted toward and away from the entrance end of the machine to maintain longitudinal tension in said conveyor members, an abutment member adjustable along the machine for limiting the longitudinal movement of said idler roll, and means for adjusting the longitudinal position of the roll relatively to said abutment member.

2,107,587 — Forming of Paperboards. Ewen Ross Smith, London, England, assignor to Papercrete Limited, London, England. Application August 19, 1935, Serial No. 36,925. In Great Britain August 20, 1934. 3 Claims. (Cl. 92—61). Apparatus for forming paper board by the paper making process comprising two platens movable relatively to one another and enclosing a space to which stuff water is admitted, a sieve carried by one of the platens on to which a layer of pulp is deposited by suction, and a member carried by the other platen and having a flexible surface adapted to be pressed into contact with the sieve to couch the layer of pulp thereon and transfer the same from the sieve to the flexible surface preparatory to the formation of a further pulp layer upon the sieve.

2,108,116 — Paper Making Machine. Henry Street Furminger, Appleton, Wis. Application May 4, 1936, Serial No. 77,777. 4 Claims. (Cl. 92—39). A paper making machine including two spaced opposed Fourdrinier wires having their upper runs traveling toward each other, a cylinder mold in the space between the two wires, means for forming paper webs on said wires, means located to contact a bare web from one of the wires for guiding the web directly from the wire onto the cylinder mold, a looped felt above the cylinder mold and entirely in spaced relation above the wire delivering the web to the mold, said felt having its upper run traveling in a direction opposite to the direction of travel of the upper run of the wire there beneath, a couch roll within the loop of said felt in pressure relation with the cylinder mold at a point located after the point where the Fourdrinier web is deposited on the mold to contact the felt against the web for picking up the web to travel with the felt around the couch roll and on the upper run of the felt and means located to contact the bare web from the other Fourdrinier wire for guiding said web directly from said wire onto the web already on the felt.

2,108,761—Fire Resistance Pulp Board. Hubert L. Becher, Trenton, N. J., assignor to Homasote Company, a corporation of New Jersey. Application March 28, 1936, Serial No. 71,535. 12 Claims. (Cl. 92—21). A highly fire resistant substantially hard surface board comprising cellulosic fibers coated with aluminum hydrate and mixed with a substantinl proportion of fuller's earth and exfoliated vermiculite.

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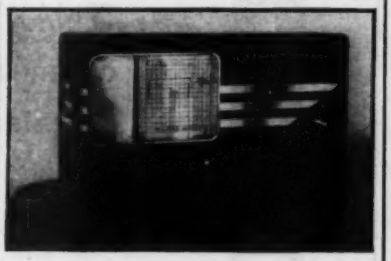

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PAPER & PULP SECTION NATIONAL SAFETY COUNCIL TWENTY NORTH WACKER DRIVE CHICAGO ILL.

The COMMERCIAL OUTLOOK

New York, March 1, 1938.

IT is generally conceded within the industry, and latest statistics substantiate assertions, that paper manufacturing activity is gradually though definitely increasing. From the standpoint of the operating index for the industry as a whole, improvement to the extent of approximately 10 to 15 per cent has been recorded since the bottom of the present recession reached in December or prior to the turn of the year. This may not constitute any very great change, but it at least shows the industry is on the way up again.

A most encouraging feature is the optimistic sentiment existing among paper manufacturers and distributors. The hundreds of paper mill officials who journeyed to New York last week for the annual paper industry convention expressed confidence bordering onto enthusiasm concerning the outlook. There was, in fact, a marked dearth of pessimism, or even a discouraging note, at the convention; nearly every speaker at the yearly gathering of paper producers and distributors was of the opinion that industry in general—and along with it the paper industry of course—would soon pull out of the prevailing dullness, and in all probability sooner than a majority are given to believe.

Another gratifying feature is the relative steadiness of paper prices. Despite the marked falling off in business in recent months, or since about the outset of the final quarter of last year, paper prices have ruled remarkably firm. There have been some declines, of course, but in no instance has there been any severe break in prices, and taken as a whole, paper prices have held their levels well. Manufacturers have not pressed for sales, and neither have jobbers or other distributors. Thus, while the industry is in an unsatisfactory position from the standpoint of demand and production, the price situation is all that could be hoped for under the circumstances.

Paper output in the United States during the last calendar year reached a new all-time total high of 12,600,000 tons, or 85 per cent of the capacity of the domestic industry, according to official estimate for 1937. This represented a rise of some 625,000 tons above the 11,975,552 tons produced in 1936, and was some 1,460,000 tons in excess of the 1929 production. Thus, as emphasized by a leading speaker at the convention last week, whereas most manufacturing industries in this country have been for the past few years striving to get back to their 1929 output level, the paper industry during 1937 forged ahead of the 1929 production basis by nearly a million and a half tons.

As the aftermath of the accumulation of newsprint by United States publishers at the lower price last year, in anticipation of the increase which became effective this year, January production of newsprint in North America declined 20.2 per cent from the total manufactured in the similar month of 1937. The sharpest falling off was reported for Canadian mills, whose output was down 23.2 per cent in January compared with a year ago, while the decrease in Newfoundland was 21.7 per cent, and in the United States only 8.6 per cent, according to the News Print Service Bureau.

January production amounted to 222,500 tons in Canada, against 289,634 tons in the same 1937 month; 72,514 tons in the United States, against 79,362 tons last year, and 22,852 tons in Newfoundland, against 29,176 tons, a total for North America of 317,866 tons, contrasted with 398,172 tons a year ago. Production ran well ahead of shipments from mills during January. Shipments by Canadian mills were only 159,107 tons for the month, and by mills in the United States, 62,829 tons. As a result stocks of newsprint at mills jumped appreciably, amounting to 106,394 tons at Canadian plants at the end of January, against 34,552 tons the end of December and 49,505 tons at the end of January last year. Stocks at United States mills the end of January were 25,924 tons, against 15,105 tons a month earlier and 18,673 tons a year before. Total Canadian and United States stocks of 132,318 tons at the end of January compared with 59,240 tons at the end of December last and 68,178 tons at the close of January, 1937.

Production of paperboard in the United States reached a total of 4,283,545 tons during 1937, a new all-time yearly high, according to the U. S. Census Bureau summary, comparing with 3,658 871 tons in the preceding year and 3,294,055 tons in 1936. Thus, last year's output of board registered an increase of 17.0 per cent over the 1936 total, and was 30.0 per cent above the 1935 production.

Board output in 1937 was at an average of 76 per cent of mills' rated capacity, rising to a high point of 92.7 per cent of capacity in April and dropping off to a low for the year of 47.8 per cent during December, comparing with an average of 73.2 per cent in the year 1936, and 67.8 per cent in 1936. New orders received by mills last year called for a total of 4,155,469 tons of board, against 3,720,996 tons in the preceding year and 3,281,525 tons in 1935. Unfilled orders held by manufacturers at the end of 1937 were for a total of 74,484 tons, contrasted with 130,472 tons at the end of 1936, and 81 894 tons at the close of 1935.

Prepared roofing shipments from mills in the United States during December last amounted to 1,098,235 squares, the lowest month's total since February, 1935, and made an aggregate for the calendar year 1937 of 29,924,201 squares, compared with a total of 32,236,580 squares shipped during 1936, and 26,050,151 squares in 1935, according to the U. S. Bureau of the Census. Last year's shipments were 7.2 per cent below the 1936 total, but showed a rise of 14.9 per cent in excess of the 1935 shipments.

◆ ◆

◆ Plans Progress for N.I.A.A. Conference

Ralph Leavenworth of Fuller & Smith & Ross, Inc., Cleveland, will head the program committee for the 1938 conference of the National Industrial Advertisers Association, to be held September 21-23 at the Statler Hotel, Cleveland. The conference is being sponsored by the Cleveland, Youngstown and Toledo chapters of the N.I.A.A.

E. A. Bossart of the Bailey Meter Co., is chairman of the attendance committee while Louis J. Ott, Ohio Brass Co.; George Corey and K. W. Akers of Griswold Eshlemen Co., are in charge of hotel arrangements. Stanley Knisely, general conference chairman, has reported that plans for the conference are "progressing rapidly."

◆ Paper Firms Lead In Dayton Safety Contest

The International Envelope Corporation and the Specialty Papers Company are leaders in their respective classifications in the second annual Dayton Safety Council's industrial safety contest now being conducted by the latter organization in conjunction with the division of safety and hygiene of the state industrial commission.

Thirteen firms are competing with the International Envelope Corporation for honors. International has gone through a three month period without a single lost-time accident being reported. The Rike Paper Products Company of the same city, was likewise the leader of its own division at the close of the three months period. The contest will close at the end of March.

◆ PROVINCIAL PAPER LTD., Port Arthur, Ontario, is undergoing improvements to its mill and property which will enable it to continue to expand its production of high grade book papers. The major change undertaken at the mill has been conversion of No. 2 paper machine to permit the manufacture of book and writing paper instead of newsprint.

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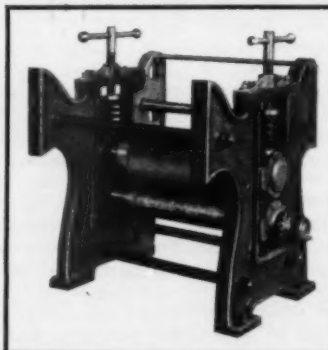

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Domestic RAW MATERIALS

◆ Papermaking Rags

The market for papermaking rags is registering scarcely no improvement at all, from a standpoint of increased activity. Paper manufacturers manifest exceedingly little interest in rags, and are acquiring supplies in noticeably small volume and in an intermittent manner, operating in the rag market the same as in other kinds of raw materials, covering only actual and immediate needs.

As ordinarily is the case during lulls of buying activity, the price trend is in favor of those on the purchasing side. Some classes of rags are about holding their own; that is the best that can be said of the price situation, and other rags are gradually sliding into lower quotable ground as demand fails to develop in anything like sufficient scope to sustain the market or to take up the offerings made by dealers. There has been further recession in prices of new cotton cuttings of most grades. Old cotton rags, with the exception of roofing stock, exhibit a declining trend. Roofing rags are the one class of rags for papermaking which seem to be at least maintaining their quotable position.

There are reports of No. 1 new white shirt cuttings being available to paper mills at 7 cents and less per pound f.o.b. shipping points; it is said to be feasible to purchase these rags probably down to 6.75 cents. However, this is understood to be the particular grade of new cuttings which are in relatively small supply, owing in part to exportations and to decreased production in recent months, and dealers are not exerting pressure to sell white shirt cuttings. Colored grades of cuttings are much softer in price. Fancy shirt cuttings are reported obtainable at 2.50 cents a pound at dealers' shipping points, new blue overall cuttings at 5.50 cents, blue cheviots at 5.75 cents, khaki cuttings at 4.50 cents, washables at 2.25 cents, pink corset cuttings at 3.25 cents, bleached canton flannels at 6.50 cents, light flannelettes at 5.75 cents, light silesias at 4.75 cents and black silesias at 3.75 cents. It is possible that buyers could shade these quoted figures in some instances.

In the East, roofing rags are quoted fairly steadily at 1.25 cents per pound basis at shipping points for No. 1 domestic classification roofing, and 85 to 90 cents a hundred pounds for No. 2 stock. Roofing felt mills are absorbing these rags in decidedly better volume than other consuming plants are purchasing the better grades of rags. Moreover, quotations on foreign roofing stock are far above ruling prices on domestic rags, with the result practically all the buying by mills is confined to domestic material. Foreign dark cottons of northern European origin are held at 1.45 to 1.50 cents a pound ex dock New York, and foreign linsey garments at up around 1.75 cents.

Old white and blue cottons are in slow demand, especially from domestic consumers, and are uncertain in price. The bulk of sales is said to be for export to Europe.

◆ Rope and Bagging

Paper manufacturers from all signs and accounts are amply supplied with old rope and scrap bagging, and are engaging in almost no buying of these raw materials. With business virtually at a standstill, prices are something of an unknown quantity, and are mainly nominal. Old No. 1 manila rope is about 3 cents per pound f.o.b. dealers' points for domestic to probably a little less for the imported article. Scrap bagging is quoted at 1.50 cents a pound at shipping points for No. 1 quality bagging, 1.85 cents or thereabouts for No. 1 domestic gunny, and 75 to 80 cents a hundred pounds for roofing bagging.

◆ Mechanical Pulp

Mechanical pulp is in slow demand; most consumers have their needs well provided for and are little desirous of adding to their supplies. Prices are largely nominal though quoted at $23 to $28 per short ton f.o.b. grinding plants in the United States or Canada, or around $35 a ton delivered consuming mills, depending on the freight haul. Canadian groundwood is $30 ex dock New York for pulp brought down from the Dominion by vessels.

Domestic groundwood production during 1937 totaled 1,624,100 short tons, according to the estimate of the United States Pulp Producers Association, compared with 1,475,620 tons produced in the year preceding as reported by the U. S. Census Bureau. This was an increase last year of 148,480 tons, or 10 per cent, over the 1936 output.

◆ Chemical Pulp

The market situation in chemical wood pulp is bordering onto dormancy. There are occasional transactions reported in small lots of resale or other spot pulp, bought by consumers against unexpected and urgent needs, but general business in the commodity is close to a standstill, owing to the fact that nearly all pulp consumers are heavily supplied with pulp in hand and on order. Prices of domestic pulp are maintained on the contract bases for the first three months of the current year, with no mention as yet made concerning second quarter quotations.

The United States produced a total of 5,040,000 short air dry tons of chemical wood pulp in 1937, according to the United States Pulp Producers Association's estimate, a rise of 820,401 tons or 19.4 per cent above an aggregate of 4,219,599 tons in 1936 reported by the U. S. Census Bureau. Last year's output established a new high record, and constituted a gain of 57.7 per cent over the 1934 total, or only three years ago. Bleached sulphite production was 1,380,000 short tons in 1937, against 1,127,939 tons in the year before; unbleached sulphite, 790,000 tons, against 693,903 tons; bleached sulphate, 229,400 tons, against 155,581 tons; unbleached sulphate, 1,977,500 tons, against 1,639,153 tons, and soda and miscellaneous pulp, 663,100 tons, compared with 603,023 tons.

◆ Chemicals

Although in a quiet market position, papermaking chemicals show a fairly steady undertone and little change quotably. Contract commitments are moving forward, but new buying is at a decidedly slow ebb.

◆ Old Paper

With paper and board mills heavily stocked with wood pulp supplies as well as other raw material, including waste paper, there is very limited disposition on their part to purchase additional old paper supplies. Demand, it can be said, is slower than has been known in a long time. Stocks are backing up upon packers and dealers, and prices are extremely weak even though some grades—more especially the bulky descriptions—are on lower quotable levels than have been witnessed in this market in many years. The situation is so serious that collectors in great number are forsaking the industry seeking other means of livelihood, and packers are curtailing their operations to the proverbial bone, in some cases practically shutting down.

Mixed waste paper in the East is $2 to $2.50 a ton or 10 to 12½ cents per hundred pounds f.o.b. shipping points. These prices mean packers are suffering a severe loss monetarily on every pound of such material they handle. Folded newspapers are 27½ to 30 cents per hundred pounds at dealers' points, old corrugated boxes 25 cents per hundred pounds, old No. 1 kraft paper 55 cents, No. 1 heavy books and magazines 50 cents, white ledgers 1.25 cents a pound, colored ledgers 70 to 75 cents a hundred pounds, hard white shavings from 1.75 to 2.25 cents a pound, depending on quality, soft white shavings 1.60 to 1.75 cents up to 2.25 cents for extra grade one-cut shavings, and hard white envelope cuttings 2.25 to 2.35 cents.

◆ Pulpwood

Demand for pulpwood is comparatively quiet and prices have recorded some easing. Quotations in the upper New York State district are $15 a cord for peeled wood f.o.b. Watertown, $16 for handshaved and $17 to $18 for two-foot rossed wood.

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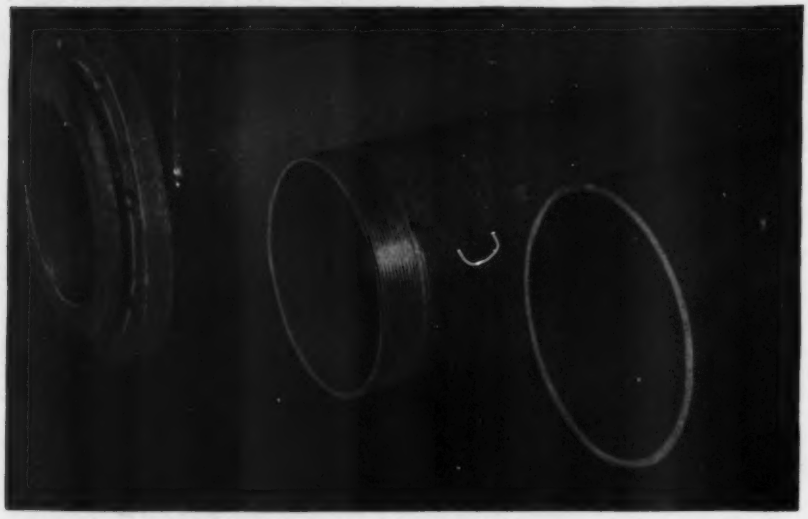

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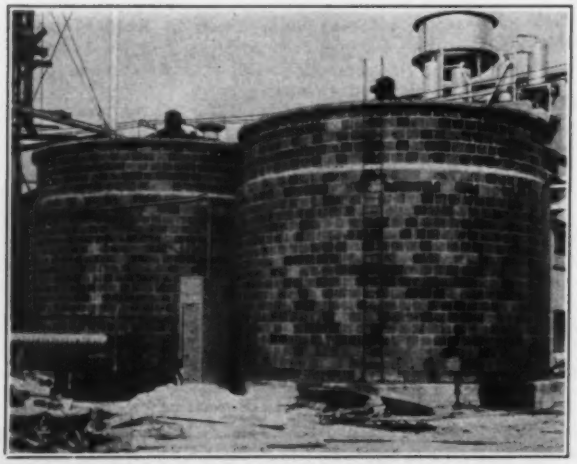

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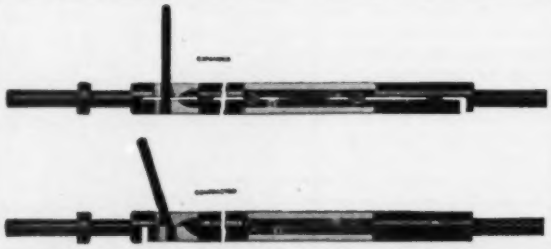

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Import and Export MARKETS

IMPORTS

◆ Wood Pulp

Importations of wood pulp into the United States totaling 2,394,765 short tons, air dry weight, of all classes of pulp-mechanical and chemical—having an aggregate value of $98,298,022, according to figures compiled from official U. S. Commerce Department reports, established a new all-time record for the third consecutive calendar year. Last year's imports showed increases of 5.1 per cent in volume and 18.5 per cent in value contrasted with a total of 2,277,829 short tons valued at $82,891,000 imported during 1936, following gains of 17.8 per cent in quantity and 17.1 per cent in value in 1936 over 1,933,643 tons of a value of $70,760,951 during 1935.

Compared with 1932, in which year pulp imports into this country were at the bottom of the depression period, last year's total receipts of the commodity from outside sources represented a rise of 912,806 tons or 61.5 per cent in tonnage, and $51,376,649 or 109.9 per cent in value. In brief, within a space of five years, United States pulp imports have climbed almost two-thirds in volume and have more than doubled in total value. The aggregate valuation of pulp imports during 1937 set a new all-time record of $98,298,022 for both mechanical and chemical classes of pulp, exceeding the previous high yearly value of $91,487,071 in 1926.

Chemical pulp imports last year amounted to 2,176,343 short tons, air dry weight, valued at $93,955,854, according to our Government's figures, exceeding the two-million-ton mark for the second time in any year, and showing increases of 6.1 per cent in volume and 19.1 per cent in value over a total of 2,050,051 short tons valued at $78,839,776 in 1936, the previous record year as far as concerned the tonnage of imports. Contrasted with 1935 arrivals, last year's importations of chemical pulp constituted gains of 24 8 per cent in quantity and 39.2 per cent in aggregate value. Mechanical pulp imports during 1937 were slightly below the volume of the preceding year but registered an increase in value, the year's receipts of such pulp reaching 218,422 short air dry tons of a declared value of $4,342,168, against 227,778 short tons valued at $4,051,224 in 1936, a decrease of 4.1 per cent in volume and a rise of 7.1 per cent in value last year.

Imports of bleached sulphite into the United States in 1937 totaled 511,961 short tons valued at $29,443,254, against 512,168 tons valued at $25,824,769 in the year preceding; of unbleached sulphite, 919,680 tons valued at $34,663,053, against 786,720 tons valued at $26,778,644; of unbleached sulphate or kraft pulp, 622,353 tons valued at $22,269,976, against 635,722 tons valued at $19,771,988; of bleached sulphate, 111,862 tons valued at $7,014,450, against 102,375 tons valued at $5,844,031, and of soda pulp, 10,327 tons valued at $536,212, against 12,737 tons of a value of $565,572.

Sweden, as previously, was the principal source of wood pulp imported into the United States during 1937, that country supplying 1,129.940 short tons of all kinds of pulp, valued at $42,432,134, or 47.1 per cent of the aggregate pulp imports for the year. Canada was second on the list of pulp suppliers, a total of 712,076 short tons of all pulp of a value of $33,030,580 being received from that country, or 29.7 per cent of our total importations during the year, while imports from Finland amounted to 285,798 short tons valued at $11,051,741 or 11.9 per cent of the year's total; from Norway, 106,946 tons valued at $5,102,261, or 4.4 per cent of the total, and from Germany, 69 060 short tons valued at $2,804,270, or 2.8 per cent of the 1937 imports.

Activity in the imported pulp market is still at a very low ebb. There is, in fact, scarcely any current buying. Paper and board manufacturers are heavily supplied with pulp which has backed up on them during the past few months, and are far more concerned with reducing inventories than in adding to their purchasing commitments. Some occasional transactions involving resale pulp are reported at prices well under nominal quotations on forward shipments from primary sources abroad, but these comprise about the only life in the market at present. Foreign producers are not by any means pressing to effect sales.

◆ Paper Stock

Import of rags for papermaking into the United States declined in quantity and value during the calendar year 1937 compared with the year preceding. A total of 244,325,164 pounds valued at $4,475,402 was imported last year, according to official U. S. Government figures, against 275,892,835 pounds of a value of $4,673,041 in 1936. On the other hand, importations of miscellaneous paper stock, comprising old rope, scrap bagging, waste paper, etc., were higher last year at 116,740,159 pounds valued at $2 685,726 than 103,435,628 pounds of a value of $1,873,639 during 1936.

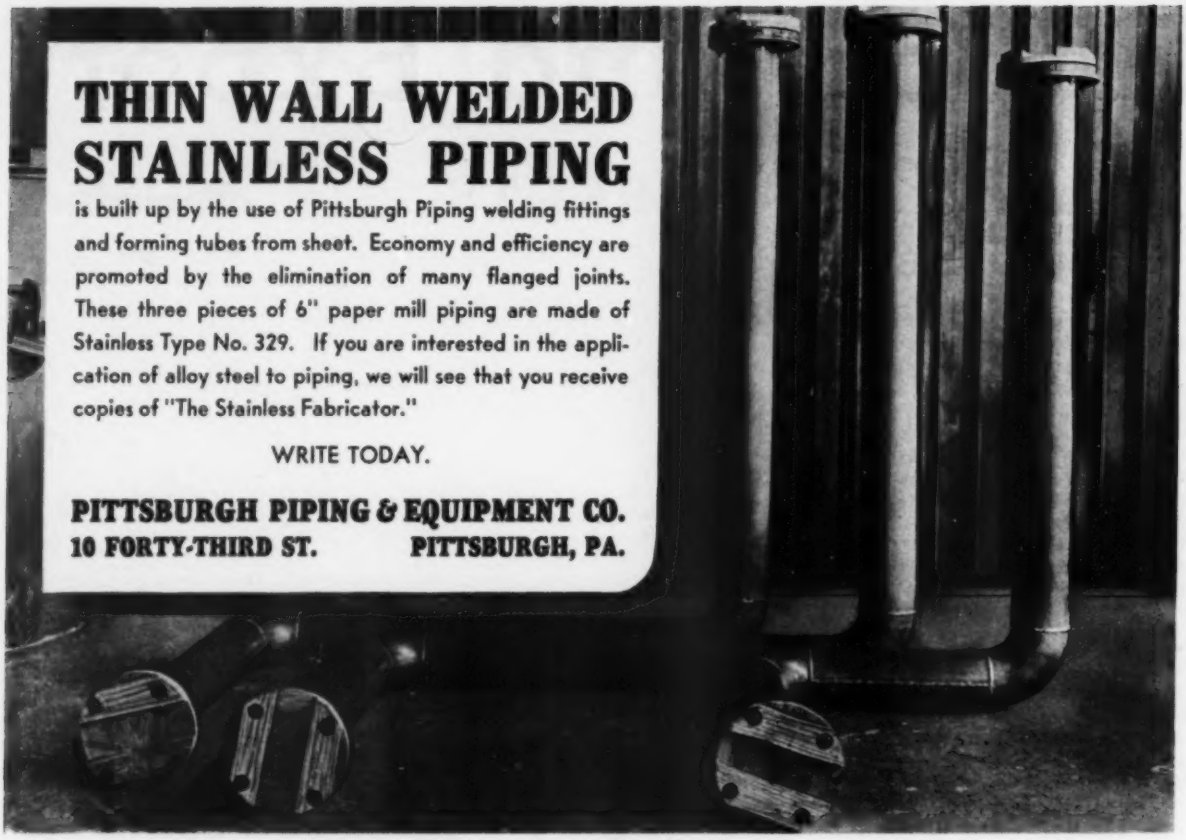
◆ Paper

The United States imported paper and paper products to the amount of $137,069,991 in value during the year 1937, contrasted with imports valued at a total of $110,112,348 in the year preceding, according to figures issued by the U. S. Department of Commerce. The great bulk of these importations was of course standard newsprint paper, receipts of which last year were 6,634,048,000 pounds valued at $122,529,421, contrasted with 5,503.161,000 pounds of a value of $96,719,470 in 1936. Cigarette paper imported last year totaled 16,010,768 pounds of a value of $3,874,925, against 15,140,394 pounds valued at $3,886,984 in 1936. Next in importance were imports of paperboard, pulpboard, cardboard, leatherboard, etc., amounting to 52,154,648 pounds valued at $1,198,205, against 42,969,074 pounds valued at $911,130 in 1936.

EXPORTS

Exports of paper and paper products from the United States during 1937 scored an appreciable gain over the year before, reaching a total value last year of $31,088,199, according to official U. S. Department of Commerce reports, a rise of $8,627,657 or 38.4 per cent above exports valued at $22,460,542 in 1936. Nearly all the major classes of paper and board showed increases last year. Shipments overseas of newsprint paper reached a total value in 1937 of $961,337, against $594,131 in 1936; of uncoated book paper, $1,822,130, against $997,572; of writing paper, $3,011,113, against $1,983,658; of wrapping paper, except kraft, $2,192,351, against $1,846,699; of kraft wrapping, $437,823, against $249,543; of overissue and old newspapers, $2,013,511, against $932,779; of boxboard, $1,787,068, against $1,241,307; of other paperboard, $1,561,910, against $1,063,121; of fiber insulating board, $1,797,966, against $1,451,618; of tissue and crepe paper, $1,031,773, against $579,327; of toilet paper, $928,040, against $579,327; of greaseproof and waterproof paper, $1,864,392, against $1,604,256; of sheathing and building paper, $527,075, against $314 683; of paper bags, $1,221,532, against $798,339, and of paper boxes and cartons, $914,326, against $740,324.

Exports of paper base stocks last year amounted in value to $22,987,498, contrasted with $11,984,251 in the year before, or almost double in 1937. This increase was due mainly to larger shipments of sulphite pulp, a total of 207,589 tons of bleached sulphite valued at $15,528,810 being exported last year, against 119,528 tons valued at $8,098,962 in 1936, and 84,574 tons of unbleached sulphite of a value of $3,806,867, contrasted with 68,043 tons valued at $2,173,815.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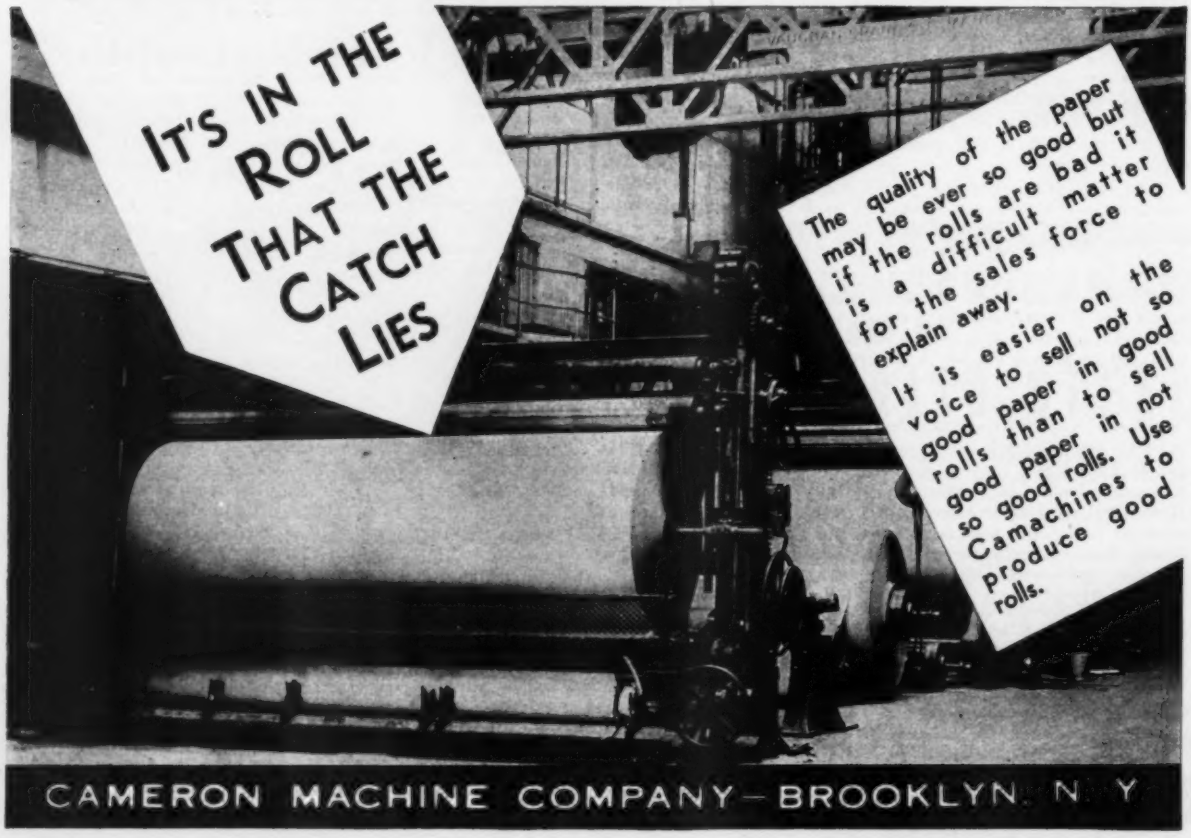
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Gauges (Vacuum)
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Gears
DeLaval Steam Turb. Co.
Dodge Mfg. Co.
Foote Bros. Gear & Machine Corp.
General Electric Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Link-Belt Company
Poole Fdy. & Mch. Co.

Gears (Herringbone)
Link-Belt Company
Poole Fdry. & Mch. Co.

Gears (Silent Chain)
Link-Belt Company

Gears (Worm)
Beloit Iron Works
DeLaval Steam Turb. Co.
Link-Belt Company
Poole Fdry. & Mch. Co.

Generating Sets
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Generators (Steam)
General Electric Co.

Generators (Turbo)
Allis-Chalmers Mfg. Co.
Chicago Electric Co.
General Electric Co.
Moorhead-Reitmeyer Co., Inc.
Westinghouse Electric & Mfg. Co.

Glass Pipe
Corning Glass Works

Governors (Speed)
Mason-Neilan Regulator Co.

Governors (Turbine)
Rodney Hunt Mach. Co.

Granite Rolls
Beloit Iron Works
Improved Paper Mach'y Corp.
B. F. Perkins & Son, Inc.

Grease
The Pure Oil Co.
Shell Petro. Corp.
Socony-Vacuum Oil Co.
Standard Oil Co. (Ind.)
The Texas Company

Grease Cups
Link-Belt Company
The Lunkenheimer Co.

Grinders (Pulp)
Carthage Machine Co.

Grinding Wheels
Norton Co.
Simonds Worden White Co.

Hangers
Dodge Mfg. Co.
Link-Belt Company
The Medart Co.

Heat Exchangers
Worthington Pump & Mach'y Corp.

Heaters (Unit)
D. J. Murray Mfg. Co.
J. O. Ross Eng. Corp.

Heaters (Feed Water)
Cochrane Corporation
Worthington Pump & Mach'y Corp.

Heating Systems
J. O. Ross Eng. Corp.

Hoists (Chain)
American Chain & Cable Co.
J. T. Ryerson & Son, Inc.
Wright Mfg. Division

Hoists (Electric)
American Engineering Co.
General Electric Co.
Shepard Niles Crane & Hoist Co.

Hoists (Portable, Air and Steam)
Allis-Chalmers Mfg. Co.

Hoists (Skip)
Robins Conveying Belt Co.

Hoods (Paper Machine)
J. O. Ross Eng. Corp.

Hose
Boston Woven Hose & Rubber Company
United States Rubber Products, Inc.

Hydrators
Love Brothers, Inc.
D. J. Murray Mfg. Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
The Brown Instrument Co.
Cambridge Instrument Co.
Taylor Instrument Cos.

Indicators (Super Heat)
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Interfolding Machines
Hudson-Sharp Machine Co.

Iron & Steel Supplies
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Joints (Dryer)
Beloit Iron Works
Carthage Machine Co.
The Johnson Corporation

Jordan Engines
Emerson Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Machine Co.
Smith & Winchester Co.

Knives (Machine)
John W. Bolton & Sons
Simonds Worden White Co.

Knot Saws
D. J. Murray Mfg. Co.

Knotters
Improved Paper Mach'y Corp.
Moore & White Co.
Trimbey Machine Works

Latex
United States Rubber Products, Inc.

Layboys
Moore & White Co.

Lead Alloy Pipe
National Lead Co.

Lead Alloy Sheets
National Lead Co.

Lift Trucks (Electric)
Yale & Towne Mfg. Co.

Lubricants
The Pure Oil Co.
Shell Petro. Corp.
Socony-Vacuum Oil Co.
Standard Oil Co. (Ind.)
The Texas Company

Lubricating Systems
S. F. Bowser & Co., Inc.
The Lunkenheimer Co.

Lubricators
S. F. Bowser & Co., Inc.
The Lunkenheimer Co.

Machine Shop Equipment
J. T. Ryerson & Son, Inc.

Materials Handling Systems
Link-Belt Company
Robins Conveying Belt Co.

Mechanical Packing
Garlock Packing Co.

Meters
Cochrane Corporation
Mason-Neilan Regulator Co.
Taylor Instrument Cos.
Worthington Pump & Mach'y Corp.

Meters (Flow)
Bailey Meter Co.
The Brown Instrument Co.
Cochrane Corporation

Meters (Liquid Level)
Cochrane Corporation
Mason-Neilan Regulator Co.

Mill Cogs
N. P. Bowsher Co.

Mixers
Patterson Foundry & Machine Company

Motor Drives
Patterson Foundry & Machine Company

Motor Generator Sets
Allis-Chalmers Mfg. Co.
Chicago Electric Co.
Moorhead-Reitmeyer Co., Inc.
Westinghouse Electric & Mfg. Co.

Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Motors (Rebuilt)
Chicago Electric Co.
Moorhead-Reitmeyer Co., Inc.

Napkin Folders
Hudson-Sharp Machine Co.
Paper Conv. Mach. Co.

Oil
The Pure Oil Co.
Shell Petro. Corp.
Socony-Vacuum Oil Co.
Standard Oil Co. (Ind.)
The Texas Company

Oil Cups
The Lunkenheimer Co.

Oil Storage Systems
S. F. Bowser & Co., Inc.

Packing (Mechanical)
Garlock Packing Co.
United States Rubber Products, Inc.

Paper Bag Machinery
Smith & Winchester Co.

Paper Calender Rolls
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Paper Cutters & Slitters
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

Paper Dampeners
B. F. Perkins & Son, Inc.

Paper Machine Drives
Beloit Iron Works
Bird Machine Co.
Dodge Mfg. Corp.
Downingtown Mfg. Co.
General Electric Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Smith & Winchester Co.
Westinghouse Electric & Mfg. Co.

Paper Machines
Bagley & Sewall Co.
Beloit Iron Works
Black-Clawson Co.
Downingtown Mfg. Co.
Pusey & Jones Corp.
Smith & Winchester Co.

Paper Manufacturers
Kalamazoo Vegetable Parchment Co.

Paper Roll Trucks
Central Machine Works

Paper Testing Instruments
B. F. Perkins & Son, Inc.

Pebble Mills
Patterson Foundry & Machine Company

Penstocks
Chicago Bridge & Iron Co.
Rodney Hunt Mach. Co.

Perforated Metal
Harrington & King Perforating Co.

pH Control (Automatic)
Wilkens-Anderson Co.

Pillow Blocks
Beloit Iron Works
Dodge Mfg. Corp.
Link-Belt Company

Pipe
Duriron Co.
Pittsburgh Piping & Equipment Company
J. T. Ryerson & Son, Inc.

Pipe Fittings
Cooper Alloy Foundry Co.
Taylor Forge & Pipe Wks.

Pipe (Glass)
Corning Glass Works

Pipe (Lead Alloy)
National Lead Co.

Pipe (Riveted or Welded)
Chicago Bridge & Iron Co.

Pipe (Spiral Lock-Seam)
Naylor Pipe Co.

Pipe (Spiral Riveted)
Taylor Forge & Pipe Wks.

Pipe (Spiral Welded)
American Rolling Mill Co.
Naylor Pipe Co.
Taylor Forge & Pipe Wks.

Pipe Systems Installed
The Grinnell Co., Inc.
Pittsburgh Piping & Equipment Company

Pipe & Tubes (Stainless)
J. T. Ryerson & Son, Inc.

Platers
B. F. Perkins & Son, Inc.

Plates (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Platework (Steel)
Chicago Bridge & Iron Co.

Plating (Chromium)
Chromium Corp. of Amer.

Power Transmission
Allis-Chalmers Mfg. Co.
Dodge Mfg. Corp.
Link-Belt Company
The Medart Co.
J. E. Rhoads & Sons

Press Rolls (Granite)
Beloit Iron Works
Downingtown Mfg. Co.
B. F. Perkins & Son, Inc.

Pressure Joints (Rotary)
Beloit Iron Works
The Johnson Corporation

Protective Coatings
Quigley Company, Inc.

Pulleys
Carthage Machine Co.
Dodge Mfg. Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Link-Belt Company
The Medart Co.
D. J. Murray Mfg. Co.
Rockwood Mfg. Co.

Pulp (Chemical)
Weyerhaeuser Timber Co.

Pulpers
Bauer Bros. Co.

Pulp Process (Chem.)
Chemipulp Process, Inc.

Pulp Screens
Bird Machine Co.
D. J. Murray Mfg. Co.

Pulp Stones
Norton Co.

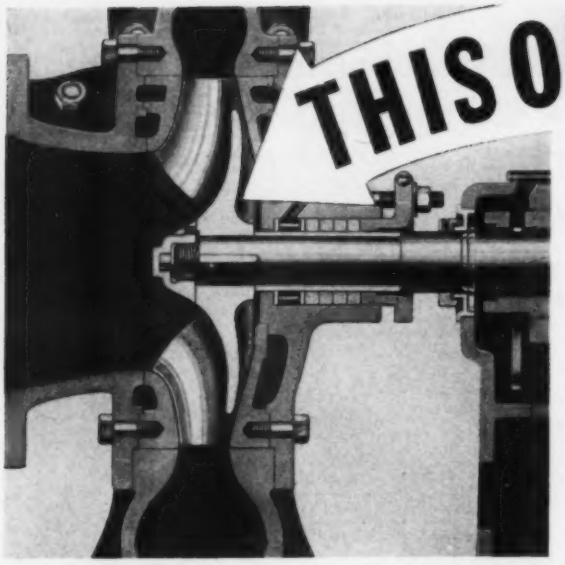
Pulp Thickeners
Bird Machine Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Moore & White Co.
D. J. Murray Mfg. Co.
Oliver United Filters Inc.

Pulpwood Stackers
Link-Belt Company

Pumping Machinery
Lawrence Machine & Pump Co.

Pumps (Acid)
Duriron Co., Inc.
Oliver United Filters Inc.
Roots-Connersville Blower Corp.

Pumps (Boiler Feed)
Buffalo Pumps, Inc.
DeLaval Steam Turb. Co.
Frederick Iron & Steel Co.
Goulds Pumps, Inc.
Morris Machine Works
Roots-Connersville Blower Corp.
Worthington Pump & Mach'y Corp.



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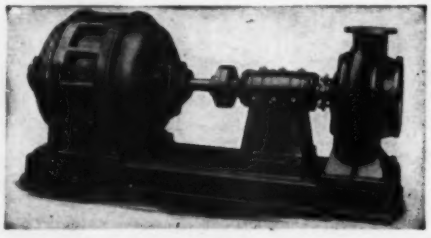

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Downingtown Mfg. Co.
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Frederick Iron & Steel Co.
Goulds Pumps, Inc.
Ingersoll-Rand Company
Lawrence Machine & Pump Co.
Morris Machine Works
Nash Engineering Co.
Oliver United Filters Inc.
Smith & Winchester Co.
Warren Steam Pump Co.
Worthington Pump & Mach'y Corp.

Pumps (Deep Well)
Layne & Bowler, Inc.
Worthington Pump & Mach'y Corp.

Pumps (Rotary)
Roots-Connersville Blower Corp.

Pumps (Stock)
Allis-Chalmers Mfg. Co.
Beloit Iron Works
Buffalo Pumps, Inc.
Carthage Machine Co.
Downingtown Mfg. Co.
Economy Pumps, Inc.
Frederick Iron & Steel Co.
Goulds Pumps, Inc.
Moore & White Co.
Morris Machine Works
Sandusky Foundry & Machine Co.
Shartle Bros. Machine Co.
Smith & Winchester Co.
Warren Steam Pump Co.
Worthington Pump & Mach'y Corp.

Pumps (Turbine)
Roots-Connersville Blower Corp.

Pumps (Vacuum)
Foster Wheeler Corp.
Nash Engineering Co.
Oliver United Filters Inc.
Roots-Connersville Blower Corp.
Sandusky Foundry & Machine Co.
Worthington Pump & Mach'y Corp.

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The Brown Instrument Co.
Cambridge Instrument Co.
Taylor Instrument Cos.

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Rebuilt Motors
Chicago Electric Co.
Moorhead-Reitmeyer Co., Inc.

Reclaiming Systems (Oil)
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The Brown Instrument Co.
Cambridge Instrument Co.
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Recovery Systems (Chemical Pulp)
Chemipulp Process, Inc.
D. J. Murray Mfg. Co.
J. O. Ross Eng. Corp.

Reels
Beloit Iron Works
Downingtown Mfg. Co.
Hudson-Sharp Machine Co.
Moore & White Co.
Smith & Winchester Co.

Reels (Automatic Collapsing)
Downingtown Mfg. Co.

Refiners
Bauer Brothers Co.
Dilts Machine Works
Emerson Mfg. Co.
Gruendler Crusher & Pulv. Co.
E. D. Jones & Sons Co.
Love Brothers, Inc.
D. J. Murray Mfg. Co.
Wiener Refiner Eng. Co.

Regulators (Steam)
Mason-Neilan Regulator Co.

Regulators (Pressure and Temperature)
The Brown Instrument Co.
Cochrane Corporation
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Regulators (Steam)
Mason-Neilan Regulator Co.

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Oakite Products, Inc.

Resurfacer (Concrete)
Flexrock Company

Rewinders
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Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

Rod Mills
Allis-Chalmers Mfg. Co.
Patterson Foundry & Machine Company

Roll Heading Machines
D. J. Murray Mfg. Co.

Roll Stands
Cameron Machine Co.

Roller Bearing Units
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Link-Belt Company

Rolls
Beloit Iron Works
Carthage Machine Co.
Downingtown Mfg. Co.
Rodney Hunt Mach. Co.
Improved Paper Mach'y Corp.
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Rolls (Embossing)
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Rolls (Rubber Covered)
Beloit Iron Works
Downingtown Mfg. Co.
Rodney Hunt Mach. Co.
United States Rubber Products, Inc.

Roof Drying Systems
J. O. Ross Eng. Corp.

Roofing & Siding (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Rosin Size
Hercules Powder Co., PMC

Rotary Incinerators
D. J. Murray Mfg. Co.

Rotary Pressure Joints
Beloit Iron Works
The Johnson Corporation

Rotary Printing Units
Paper Conv. Mach. Co.

Rust Preventatives
Oakite Products, Inc.

Safety Treads
J. T. Ryerson & Son, Inc.

Salt Cake
General Chemical Co.
Pennsylvania Salt Mfg. Co.

Save-Alls
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Moore & White Co.
Oliver United Filters Inc.

Saws
Simonds Worden White Co.

Screen Diaphragms
United States Rubber Products, Inc.

Screen Plates
Bird Machine Co.

Screens (Centrifugal)
Improved Paper Mach'y Corp.

Screens (Chip)
Carthage Machine Co.
Link-Belt Co.
D. J. Murray Mfg. Co.

Screens (Diaphragm)
D. J. Murray Mfg. Co.

Screens (Flat)
Beloit Iron Works
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
D. J. Murray Mfg. Co.
Robins Conveying Belt Co.

Screens (Rotary)
Bird Machine Co.
E. D. Jones & Sons Co.
Moore & White Co.
Trimbey Machine Works

Second Hand Machy.
Shartle Bros. Machine Co.

Separators (Chip)
Carthage Machine Co.

Shafting
Allis-Chalmers Mfg. Co.
E. D. Jones & Sons Co.
Link-Belt Company
The Medart Co.
Midwest-Fulton Mach. Co.
J. T. Ryerson & Son, Inc.

Shafts (Collapsible)
Cameron Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.

Sheets (Lead Alloy)
National Lead Co.

Sheets (Lead)
National Lead Co.

Sheet Metal Work
J. O. Ross Eng. Corp.

Sheets (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Sheets (Stainless Steel)
J. T. Ryerson & Son, Inc.

Short Center Drives
Rockwood Mfg. Co.

Shower Pipes
Beloit Iron Works
Bird Machine Co.
Downingtown Mfg. Co.
Emerson Mfg. Co.
Moore & White Co.
Sandusky Foundry & Machine Co.
Smith & Winchester Co.

Shredders
Carthage Machine Co.
E. D. Jones & Sons Co.

Sifters
Patterson Foundry & Machine Company

Silent Chain Drives
Link-Belt Company

Silicate of Soda
General Chemical Co.
Pennsylvania Salt Mfg. Co.

Sizing
National Oil Products Co.

Slashers
D. J. Murray Mfg. Co.

Slitting & Rewinding Mach.
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

Sluice Gates
D. J. Murray Mfg. Co.

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Columbia Alkali Corp.
Hercules Powder Co., PMC
Mathieson Alkali Works
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.

Sodium Aluminate
Pennsylvania Salt Mfg. Co.

Special Machinery
Beloit Iron Works
Downingtown Mfg. Co.
Hudson-Sharp Machine Co.
Rodney Hunt Mach. Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.

Speed Changers
Rodney Hunt Mach. Co.
Lewellen Mfg. Co.
Link-Belt Co.

Speed Reduction Units
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Foote Bros. Gear & Machine Corp.
Rodney Hunt Mach. Co.
Link-Belt Company
Midwest-Fulton Mach. Co.
Poole Foundry & Machine Co.

Splitters (Wood)
Carthage Machine Co.
D. J. Murray Mfg. Co.

Sprockets
Improved Paper Mach'y Corp.
Link-Belt Company

Stainless Steel Sheets
J. T. Ryerson & Son, Inc.

Steam Joints
Beloit Iron Works
The Johnson Corporation
Shartle Bros. Machine Co.

Steam Purifiers
Cochrane Corporation

Steam Traps
Cochrane Corporation
Midwest-Fulton Mach. Co.
Stickle Steam Spec. Co.

Steel (Bars, Shapes, Plates, Sheets, Etc.)
Joseph T. Ryerson & Son

Steel Platework
Chicago Bridge & Iron Co.
Graver Tank & Mfg. Co.

Steel Strapping
The Stanley Works

Steel Tanks
Chicago Bridge & Iron Co.
Graver Tank & Mfg. Co.

Stock Cutters
B. F. Perkins & Son, Inc.

Stokers
American Engr. Co.
Link-Belt Company
Westinghouse Electric & Mfg. Co.

Strainers
Carthage Machine Co.
The Duriron Co., Inc.
Mason-Neilan Regulator Co.

Strapping Steel
The Stanley Works

Stuff Chests
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Midwest-Fulton Mach. Co.
Moore & White Co.
D. J. Murray Mfg. Co.

Suction Boxes
Beloit Iron Works
Black-Clawson Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Pusey & Jones Corp.

Suction Felt Rolls
Beloit Iron Works
Downingtown Mfg. Co.

Suction Rolls
Beloit Iron Works
Downingtown Mfg. Co.
Sandusky Foundry & Machine Co.

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Weyerhaeuser Timber Co.

Sulphur Burners
Carthage Machine Co.
Chemical Constr. Corp.
D. J. Murray Mfg. Co.

Sulphuric Acid
General Chemical Co.
Pennsylvania Salt Mfg. Co.

Supercalenders
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Tachometers & Tachographs
Bailey Meter Co.
The Brown Instrument Co.

Tanks and Vats (Wood)
Rodney Hunt Mach. Co.
Kalamazoo Tank & Silo Co.
New England Tank & Tower Co.

Tanks (Glazed Tile)
Kalamazoo Tank & Silo Co.

Tanks (Oil)
The Lunkenheimer Co.

Tanks (Steel)
Chicago Bridge & Iron Co.
Graver Tank & Mfg. Co.

Tensile Strength & Stretch Testers
B. F. Perkins & Son, Inc.

Testers (Bursting Strength)
B. F. Perkins & Son, Inc.

Testers (Opacity)
Westinghouse Electric & Mfg. Co.

Thermometers
The Brown Instrument Co.
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Thickness Control
Lewellen Mfg. Co.

Thrashers (Rag)
Pusey & Jones Corp.

Toilet Folding Machines
Hudson-Sharp Machine Co.

Toilet Winders
Hudson-Sharp Machine Co.

Transmission (Variable Speed)
Lewellen Mfg. Co.
Link-Belt Company
Moore & White Co.

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Gifford-Wood Co.

Trippers
Robins Conveying Belt Co.

Trucks (Electric)
Yale & Towne Mfg. Co.

Trucks (Paper Roll)
Central Machine Works

Tube Mills
Patterson Foundry & Machine Company

Tubes (Nickel Alloy)
International Nickel Co.

Turbines (Steam)
Allis-Chalmers Mfg. Co.
DeLaval Steam Turb. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Turbines (Water)
Rodney Hunt Mach. Co.

Turpentine
Hercules Powder Co., PMC

Unions
The Lunkenheimer Co.

Unit Heaters
D. J. Murray Mfg. Co.
J. O. Ross Engr. Corp.

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United States Rubber Products, Inc.

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Eastwood-Nealley Corp.
The Lunkenheimer Co.
Mason-Neilan Regulator Co.
Wm. Powell Co.

Valves
Carthage Machine Co.
Cochrane Corporation
Cooper Alloy Foundry Co.
Duriron Co.
Eastwood-Nealley Corp.
International Nickel Co.
The Lunkenheimer Co.
Mason-Neilan Regulator Co.
D. J. Murray Mfg. Co.
Wm. Powell Co.

Valves (Electric & Air Operated)
The Brown Instrument Co.
The Lunkenheimer Co.
Mason-Neilan Regulator Co.

Valves (Gates)
The Lunkenheimer Co.
Wm. Powell Co.

Valves (Multiport)
Cochrane Corporation

Valves (Non-return; Emergency Stop)
The Lunkenheimer Co.
Wm. Powell Co.

Valves (Paper Stock)
Eastwood-Nealley Corp.
E. D. Jones & Sons Co.
Mason-Neilan Regulator Co.

Valves (Relief)
The Lunkenheimer Co.
Mason-Neilan Regulator Co.
Wm. Powell Co.

Valves (Vacuum Regulating)
Mason-Neilan Regulator Co.

Vapor Absorption Systems
J. O. Ross Eng. Corp.

Ventilating Fans
B. F. Perkins & Son, Inc.

Ventilating Systems
J. O. Ross Eng. Corp.

Washers
Downingtown Mfg. Co.
Improved Paper Machinery Corp.
Moore & White Co.
Oliver United Filters Inc.

Washers (Wood)
Carthage Machine Co.
Downingtown Mfg. Co.

Water Backs
Foster Wheeler Corp.

Waterproof Compounds
Flexrock Company
Quigley Company, Inc.

Water Softeners
Cochrane Corporation
Graver Tank & Mfg. Co.

Water Wheels
DeLaval Steam Turb. Co.

Wax Emulsions
Franklin Research Co.

Wax Size
Franklin Research Co.
National Oil Products Co.

Weigh Larries
Robins Conveying Belt Co.

Well Systems
Layne & Bowler, Inc.

Wet Machines
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Machinery Corp.
Smith & Winchester Co.

Whistles
The Lunkenheimer Co.

White Lead
National Lead Co.

Winders
Bagley & Sewall Co.
Beloit Iron Works
Black-Clawson Co.
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

Wire Cloth (Nickel Alloy)
International Nickel Co.

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Appleton Wire Works
Eastwood-Nealley Corp.
Lindsay Wire Weaving Co.

Wood Grapples
Link-Belt Company

Worm Drives
DeLaval Steam Turb. Co.

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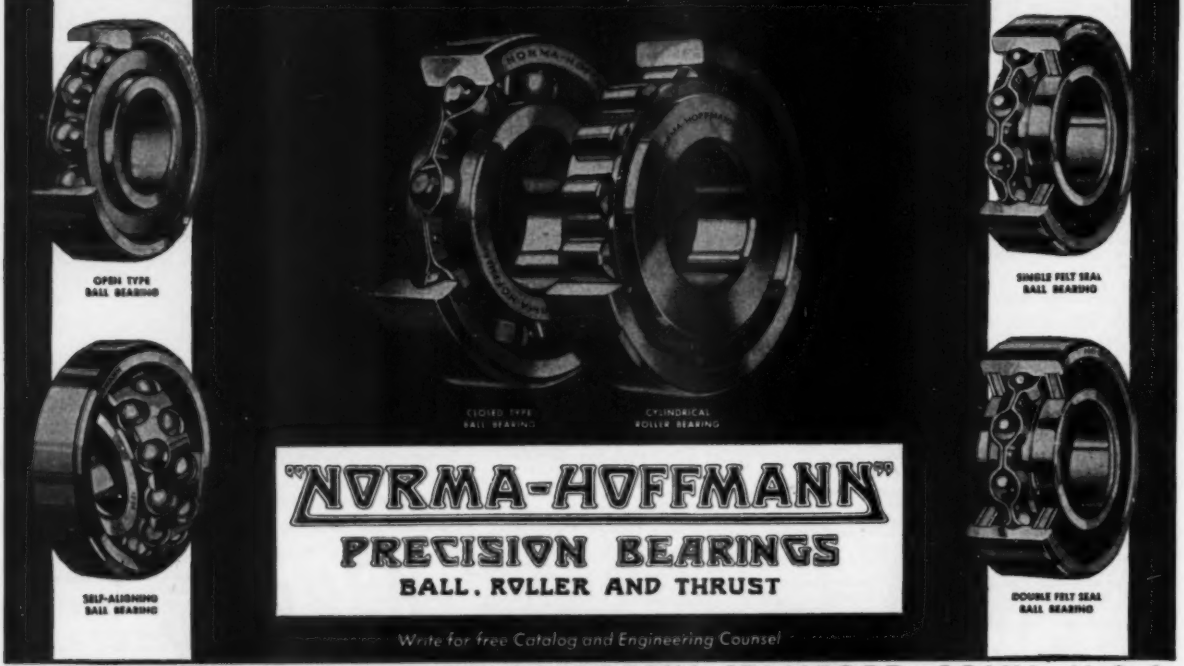
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Send for sample. Compare it, where conditions are worst, with any material you ever used.

Write for Bulletin 281-PA

QUIGLEY COMPANY, INC.
56 W. 45 ST., NEW YORK, N. Y.

Makers of HYTEMPITE "*The World's Standard High Temperature Cement*" · SPECIFICATION FIRE BRICK · INSULBRIX · INSULAG INSULBLOX · INSULCRETE · Q-CHROMASTIC · HEARTH-CRETE CAST-REFRACT · Q-SEAL · TRIPLE-A PROTECTIVE COATINGS Q-CHROME · DAMIT · ACID-PROOF CEMENTS · *ANNITE*

Distributors with Stocks and Service in Important Industrial Centers Throughout the United States, Canada, and in 32 Other Countries.
In Canada, Quigley Company of Canada, Limited, Lachine, P. Q.

AN ADDRESS *To Remember*

Insist on this trade-mark when buying Felts

The paper industry knows that our Felts are outstanding for their standard, uniform quality and dependability. . . . These Felts are long-wearing and they assure paper made with the finest finish. . . . They are woven to permit machine operation at top speed at all times.

We are at your service always—just address

The Waterbury Felt Co.
SKANEATELES FALLS, N. Y.

Alphabetical Index to Our Advertisers

When writing them, please mention The Paper Industry

Allis-Chalmers Mfg. Co.....1379
American Chain & Cable Co., Inc...1476
American Engineering Co. 1381
American Rolling Mill Co...1441, 1445
Appleton Wire Works, Inc.....
Appleton Woolen Mills.....1380
Asten-Hill Mfg. Co.....1452
Bagley & Sewall Co.....1337
Bailey Meter Company.....
Bauer Brothers Co., The.....
Beloit Iron Works.....
Binney & Smith Company.....1470
Bird Machine Company.....
Black-Clawson Co.....1393
Bolton & Sons, Inc., John W.....1458
Boston Woven Hose & Rub. Co..1374-5
Bowser & Co., Inc., S. F.....
Bowsher Co., The N. P.....1442
Brown Instrument Co., The.....1365
Bryant Paper Company.....1472
Buffalo Pumps, Inc. .....
Bulkley, Dunton & Co.....1542
Cambridge Instrument Co., Inc....1452
Cameron Machine Co.....1468
Carthage Machine Co. .....
Central Machine Works.....
Chain Belt Company.....
Chemical Construction Corporation.
Chemipulp Process, Inc.....1378
Chicago Bridge & Iron Company...1457
Chicago Electric Company.....1442
Chromium Corp. of America.....1450
Cochrane Corporation 1454
Columbia Alkali Corp., The.....1392
Cooper Alloy Foundry Co.....1452
Corning Glass Works.....
Dayton Rubber Mfg. Co.....
De Laval Steam Turbine Co.....1360
Dilts Machine Works, Inc.....1377
Dodge Mfg. Corp. .....
Downington Mfg. Co.....1st Cover
Draper Bros. Co.....1446
Duriron Company, Inc., The.....1464
Eastwood-Nealley Corporation 1376
Economy Pumps, Inc.....
Edgar Brothers Company.....
Emerson Manufacturing Co.....1458
English China Clay Sales Corp....1448
Ferguson & Co, Hardy S.....1444
Ferguson Engineers 1442
Flexrock Company 1450
Foote Bros. Gear & Machine Corp..1443
Foster Wheeler Corporation.....1343
Franklin Research Co.....
Frederick Iron & Steel Co.....1448
Garlock Packing Co., The.....
Gates Rubber Co. 1361
General Chemical Co. .....
General Electric Co. .....
Gifford-Wood Co. .....
Goulds Pumps, Inc.....1363
Graver Tank & Mfg. Co., Inc.....
Grinnell Co., Inc., The.....
Gruendler Crusher & Pulverizer Co.1450
Hammermill Paper Company.....1382
Hardy, George F.....1444
Harrington & King Perforating Co.1442
Hercules Powder Co., PMC Div....1367
Hooper & Sons Co., Wm. E.....1362
Hudson-Sharp Machine Co.....1464
Hunt Machine Co., Rodney.....1448
Huyck & Sons, F. C.....
Hyatt Bearings Div., General Motors
Improved Paper Mach'y Corp.....1356
Ingersoll-Rand Co. .....
International Nickel Co., Inc.....
Jeffrey Mfg. Co., The.....
Johnson Corporation, The.....1475
Jones & Sons Co., E. D.....1352
Kalamazoo Tank & Silo Co.....1466
Kalamazoo Vegetable Parchment Co.1470
Koppers Company 1371
Krebs Pigment & Color Corp.....1385
Langston Co., Samuel M.....3rd Cover
Lawrence Machine & Pump Corp..1447
Layne & Bowler, Inc.....1454
Lewellen Mfg. Co. 1349
Lindsay Wire Weaving Co., The..1344
Link-Belt Company 1373
Lockport Felt Co.....1462
Love Brothers, Inc. 1456
Lunkenheimer Co., The.....1384
Mason-Neilan Regulator Co.....
Mathieson Alkali Works, Inc.....1368
Mead Corporation, The.....1458
Medart Company, The.....
Menasha Products Co., The.....1476
Michigan Steel Casting Co.....1466
Midwest-Fulton Machine Co.....1448
Moore & White Co.....1442
Moorhead-Reitmeyer Co., Inc.....1442
Morris Machine Works.....1338
Murray Mfg. Co., D. J.....1466
Nash Engineering Co., The.....1386
National Lead Company.....1364
National Oil Products Co.....1454
National Safety Council.....1462
Naylor Pipe Company.....1461
New England Tank & Tower Co...
Northwest Paper Co., The.....1355
Norma-Hoffmann Bearings Corp....1474
Norton Company 1348
Oakite Products, Inc. 1464
Oliver United Filters, Inc.....1388
Orr Felt & Blanket Co., The.....1460
Paper Converting Machine Co....
Patterson Fdry. & Mach. Co.....
Pennsylvania Salt Mfg. Co.....
Perkins & Son, Inc., B. F.....1387
Pittsburgh Piping & Equipment Co.1468
Poole Foundry & Machine Co.....1460
Powell Company, The Wm.....1389
Pure Oil Co., The.....
Pusey & Jones Corp., The.....
Quigley Company, Inc. 1474
Rhoads & Sons, J. E.....
Robins Conveying Belt Co.....1354
Rockwood Mfg. Co., The.....2nd Cover
Roots-Connersville Blower Corp...1460
Ross Engineering Corp., J. O.....1391
Rust Engineering Co., The 1444
Ryerson & Son, Inc., Jos. T...1394, 1447
Sandusky Foundry & Machine Co..1444
Shartle Bros. Machine Co.....1393
Shell Petroleum Corporation.....
Shepard Niles Crane & Hoist Co...1448
Shuler & Benninghofen.....1390
Simonds Worden White Co.....1446
S K F Industries, Inc.....1353
Smith & Winchester Mfg. Co.....1383
Socony-Vacuum Oil Co., Inc.....
Solvay Sales Corporation.....1446
Southeastern Governors Conference
Standard Oil Co. (Ind.).....4th Cover
Stanley Works, The.....1447
Stebbins Engr. & Mfg. Co.....
Stickle Steam Specialties Co.....1442
Taylor Forge & Pipe Works.....1453
Taylor Instrument Companies.....1339
Texas Company, The.....1340-1
Textile-Finishing Machinery Co....
Timken Roller Bearing Co.....1359
Titanium Pigment Corporation....1357
Turner Halsey Company.....1358
United States Rubber Co.....
Vanderbilt Co., Inc., R. T.....1345
Warren Steam Pump Co., Inc.....1472
Waterbury Felt Co.....1474
Westinghouse Electric & Mfg. Co..1350
Weyerhaeuser Timber Co.....1366
Wiener Refiner Engineering Co....1442
Wilkens-Anderson Company 1461
Worthington Pump & Mchy. Corp.1346-7
Wright Manufacturing Division...1476
Yale & Towne Mfg. Co.....1351

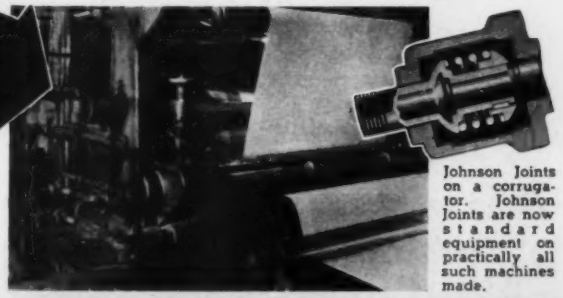
You are paying for this advanced "steam fit"— *why not* HAVE *it!*

YOU are paying in wasted time — time spent in repacking, adjusting and oiling. And you are paying in wasted power and rapid deterioration of your old-time steam fits.

Johnson Rotary Pressure Joints have no packing of any kind. The two special carbon graphite rings which form the bearings and pressure seal are *self-lubricating*. Sealed by the pressure, they are also *self-adjusting*. Equally important is the ball-and-socket design which compensates for angular misalignment and the annual space between the outlet and the housing which provides for lateral misalignment. These features combine to give the Johnson Joint many times the service life of former types.

There is a Johnson Joint for every type of machine with every kind of cylinder drainage.

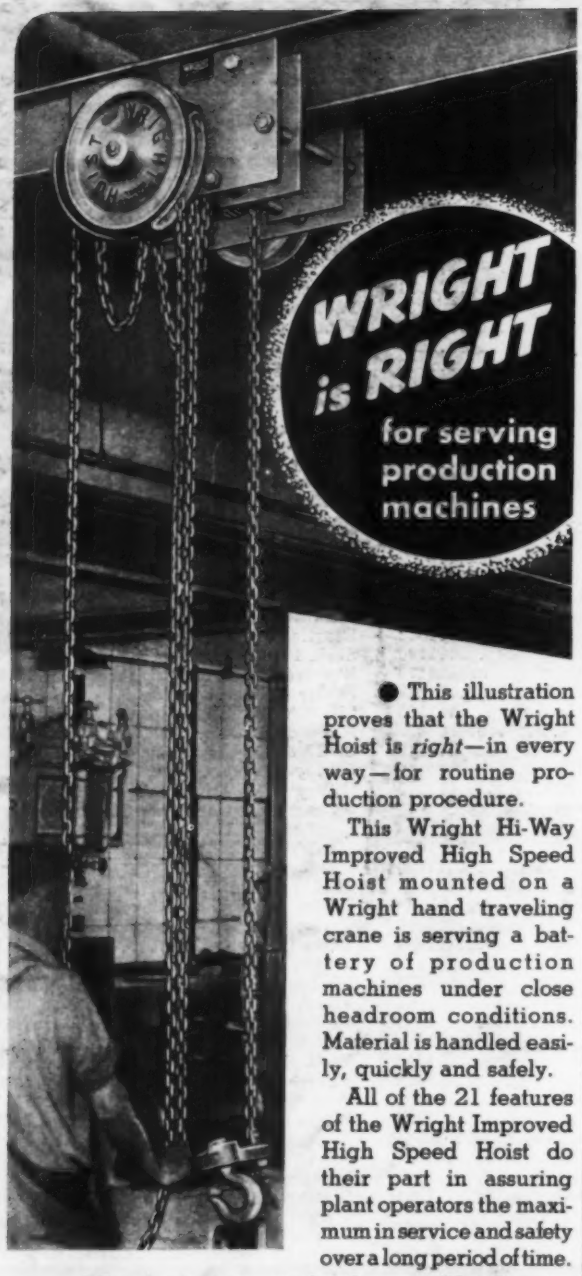
Ask for complete description of this equipment.



Johnson Joints on a corrugator. Johnson Joints are now standard equipment on practically all such machines made.

THE JOHNSON CORPORATION

845 WOOD STREET — THREE RIVERS, MICH.



● This illustration proves that the Wright Hoist is *right*—in every way—for routine production procedure.

This Wright Hi-Way Improved High Speed Hoist mounted on a Wright hand traveling crane is serving a battery of production machines under close headroom conditions. Material is handled easily, quickly and safely.

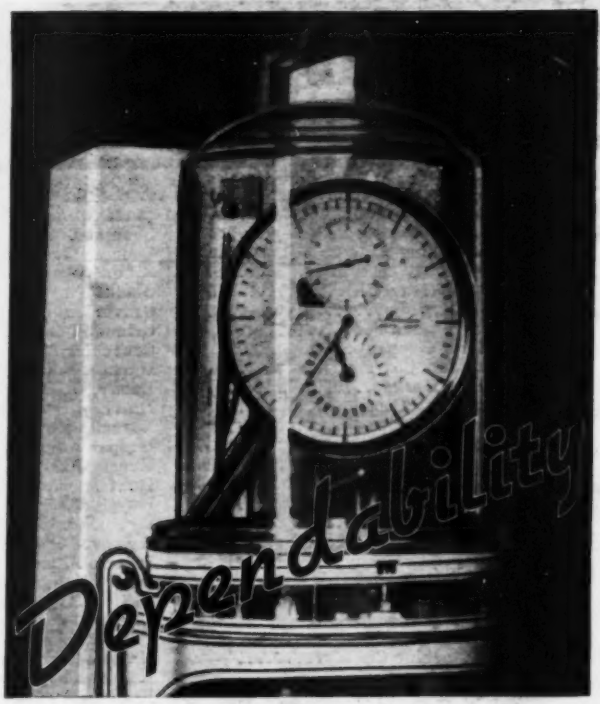
All of the 21 features of the Wright Improved High Speed Hoist do their part in assuring plant operators the maximum in service and safety over a long period of time.

Why don't you write for the new Wright catalog? It contains a world of statistical data that will prove of inestimable value to those who want to improve their material handling methods.

WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE COMPANY, INC.
YORK, PENNSYLVANIA

In Business for Your Safety

WRIGHT *Improved High Speed* **HOISTS**



(Acme Photo)

The U. S. Navy Master Clock in Washington, from which all clocks in America are governed. Regulated by the stars, it is so sensitive Congress passed a law forever prohibiting the construction of a thoroughfare within 1,000 feet of it.

In Time—In Business

Like the U. S. Navy Master Clock, Menasha has a reputation for dependability, gained after years of reliable merchandising. Dependability not only for quality products and sound selling policies, but also for that restless pioneering spirit that fosters the development of new paper specialties, profitable for the paper merchant.

Just as "like attracts like" Menasha is proud indeed that during these years it has attracted to itself merchants who are trustworthy, reliable business men, dependable in their relations with others. Menasha regards as a trust, this partnership with its dealers in promoting the uses of paper, and pledges its continued cooperation to the furtherance of the paper industry.

THE MENASHA PRODUCTS COMPANY
(DIVISION OF MARATHON PAPER MILLS CO.)

MENASHA **WISCONSIN**